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During the school year 1963-64, the Canadian Teachers Federation (CTF) distributed several thousand programs among 200 or more teachers and their pupils. This project was undertaken because programed instruction deserved more widespread trial and evaluation than it had received in most Canadian schools. The purposes of the project were (1) to give teachers first-hand experience with programed instruction, (2) to encourage teachers to evaluate the effectiveness of the programs under various conditions of use, and (3) to examine the impact of the project itself as a means of communication about educational innovations. The teachers who made use of the programs in their classes were sent an extensive questionnaire. The purpose of the survey were to determine the impact of the project upon the participants and to summarize their assessments of programed instruction. Results of the survey are indicated according to (1) background of the participants, (2) teacher knowledge of programed instruction, (3) teacher use of evaluation procedures, (4) teacher evaluation of programed instruction, and (5) attitudes toward research and innovation. (RP)

MAY - 3 1968

CANADIAN TEACHERS' FEDERATION

A CTF RESEARCH REPORT

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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PROGRAMMED INSTRUCTION

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A Survey of Attitudes and Problems

Research Division

CANADIAN TEACHERS' FEDERATION

444 MacLaren Street Ottawa, Ontario

March 1966

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TABLE OF CONTENTS

Chapter		*Page*
	ACKNOWLEDGEMENTS	iii
	LIST OF TABLES	vii
	LIST OF FIGURES	viii
1	INTRODUCTION	1
	Programmed Instruction and Teacher Research	3
	The Project	5
	The Programs	5
	The Teachers	5
	The Survey	5
	Analysis and Reporting	8
2	BACKGROUND OF THE PROJECT PARTICIPANTS	11
	Professional Status	13
	School and Community Setting	13
	Teaching Duties	14
	Summary	15
3	TEACHERS AND PROGRAMMED INSTRUCTION	17
	Knowledge of Programming	19
	Sources of Knowledge	20
	Uses of Knowledge	22
	Summary	23
4	TEACHERS AND EVALUATIVE PROCEDURES	25
	Knowledge of Evaluation	27
	The Use of Evaluative Techniques	28
	Knowledge and the Use of the Manual	29
	Summary	30
5	TEACHER EVALUATION OF PROGRAMMED INSTRUCTION	31
	Evaluations Based Upon Classroom Trials	33
	Evaluations Based Upon General Attitudes and Opinions	34
	The Bases of Teacher Assessments of the Programs	36
	Summary	39
6	ATTITUDES TO INNOVATION AND EXPERIMENTATION	41
	Communication About the Evaluations	43
	The Social Setting	43
	Social Factors Influencing Evaluation	45
	Summary	47

Chapter *Page*

7 CONCLUSION 49
Background of the Participants 51
Teacher Characteristics 51
Implications 51
Teacher Knowledge of Programmed Instruction 51
The Extent of Knowledge 51
Sources of Knowledge 51
The Use of Knowledge 51
Implications 52
Teacher Use of Evaluative Procedures 52
Extent of Knowledge 52
Use of Knowledge 52
Implications 52
Teacher Evaluation of Programmed Instruction 53
Evaluation of the Specific Programs 53
General Assessments 53
Using the Programs 53
The Bases of the Evaluations 54
Implications 54
Attitudes to Research and Innovation 54
Communication About the Project 55
The Social Setting 55
Effects Upon Evaluations of Social Setting 55
Implications 55

APPENDIX. THE QUESTIONNAIRES 57

BIBLIOGRAPHY OF RECENT RESEARCH AND WRITING ON PROGRAMMED INSTRUCTION 69

LIST OF TABLES

Table		*Page*
1	Programs Available for Evaluation by Teachers	6
2	Programmed Instruction Inquiries and Orders	7
3	Teaching Experience of Survey Participants	13
4	Degrees Held by Survey Participants	13
5	Graduate Study by Survey Participants	13
6	School Size	13
7	Community Size	14
8	Subject Specialization of Survey Participants	14
9	Grade Assignments of Survey Participants	14
10	Administrative Responsibilities of Survey Participants	14
11	Knowledge of Terms in Programmed Instruction	19
12	Knowledge of Names in Programmed Instruction	19
13	Increased Knowledge of Terms in Programmed Instruction	20
14	Increased Knowledge of Names in Programmed Instruction	20
15	Reliability Check for Increased Knowledge	20
16	Source of Knowledge About the Project	20
17	Previous Experience with Programs	21
18	Sources in Journals and Publications	21
19	Knowledge of Terms in Programmed Instruction and Use of Control Groups	22
20	Knowledge of Names Associated with Programmed Instruction and Measures of Achievement Used	22
21	Knowledge of Terms in Programmed Instruction and General Assessment of Effectiveness	22
22	Knowledge of Terms in Programmed Instruction and Perceived Role	23
23	Knowledge of Terms in Evaluation and Research	27
24	Change in Knowledge About Research and Evaluation	28
25	Extent of Teacher Evaluation	28
26	Use of Evaluation Methods	28
27	Kinds of Evaluation Used	28
28	Criteria for Assessing Effectiveness	28
29	Assignment of Pupils to Groups	29
30	Use of the Manual and Knowledge of Terms in Programmed Instruction	29
31	Use of the Manual and Knowledge of Terms in Research and Evaluation	29
32	Use of the Manual and Knowledge of Names Associated with Programmed Instruction	30
33	Assessment of Pupil Achievement	33
34	Assessments of Pupil Rates of Learning	33
35	Pupil Attitudes to Programmed Learning	34
36	Pupil Intelligence and the Effectiveness of Programs	34
37	General Effectiveness of Programs in the Classroom	34

Table *Page*

38 The Role of Programs in Classroom Instruction 35
39 Intended Future Use of Programs 35
40 Teacher Recommendations of Programs 35
41 Teacher Attitudes to Program Content 36
42 Conflicts in Course and Program Content 36
43 The Future Role of Programmed Instruction 36
44 Use of Control Groups and Pupil Achievement 37
45 Use of Control Groups and General Assessment of Effectiveness 37
46 Measures of Achievement Used and Pupil Achievement 38
47 Measures of Achievement Used and General Assessment of Effectiveness 38
48 Pupil Attitudes and Rate of Learning 38
49 Pupil Attitudes and Achievement 38
50 Pupil Achievement and Teachers' General Assessment of Effectiveness 39
51 Reports of Evaluations 43
52 Use of the Reports 43
53 Kind of Report Made 43
54 Previous Involvement in Classroom Research 44
55 Involvement with Other Teachers in the Same School 44
56 Involvement with Teachers in Other Schools 44
57 Administrative Support for Innovation 44
58 Cooperative Arrangements for Evaluation 45
59 Reasons Cited for Not Using the Programs 45
60 The Role of Teachers in Research 45
61 Differential Involvement of Teachers in the Project by Province 46
62 Superordinate Permission and Use of Control Groups 46
63 Superordinate Permission and the Measures of Achievement Used 46
64 Previous Research Experience and Use of Evaluation Design 47
65 Previous Research Experience and Use of Control Groups 47
66 Items on the Questionnaires Classified by Topic and Chapter 67

LIST OF FIGURES

Figure *Page*

1 Sample of One-Way Analysis 8
2 Sample of Two-Way Analysis 8
3 Two-Way Analysis Using Total Number of Categories 9
4 Two-Way Analysis Using Collapsed Categories 9

CHAPTER ONE

INTRODUCTION

INTRODUCTION

During the school year 1963-1964, the Canadian Teachers' Federation distributed several thousand programs among two hundred or more teachers and their pupils. The Federation undertook this project because programmed instruction constitutes a radical departure from standard teaching procedures that deserves more widespread trial and evaluation than it has received in most Canadian schools. An earlier survey of the use of programmed materials[1] indicated first that very few Canadian teachers were using programs and secondly that those who were using this medium of instruction had encountered difficulties in integrating a procedure based essentially on individual instruction and variable learning rates into the group, lock-step procedures of the typical classroom.

The purposes of the project were three-fold: (1) to give teachers first-hand experience with programmed instruction; (2) to encourage teachers to evaluate the effectiveness of the programs under various conditions of use; and (3) to examine the impact of the project itself as a means of communication about educational innovation.

Programmed Instruction and Teacher Research

How important is programmed instruction to teaching as it is now done in the school? What is the minimum change needed to integrate this new medium of instruction within standard teaching methods? The first of these questions asks essentially whether programmed instruction is of such significance that a teacher should know and understand it or go out of his way to use it. The second asks how educational innovations such as programmed instruction may be accommodated within usual, accepted teaching practices in order to provide more effective instruction. Let us look at these questions in greater detail.

Programmed instruction provides in certain circumstances highly effective conditions for learning. Widely, though incompletely, researched,[2] programmed instruction has profound implications for traditional concepts of teaching and for the usual patterns of school organization. However, the way in which programmed instruction may best be used within existing school structures has yet to be evolved. What is clear is that many problems still surround the use of programs for instruction and that the context in which they are used powerfully influences their effectiveness. Despite this uncertainty about the use of programs, the great importance of this medium of instruction stands forth clearly:

> Programmed instruction is, in the best sense of the word, a truly revolutionary device; but it is revolutionary, not so much in itself, as in its ability to interact with certain other developments in education. This interaction has the potential of freeing schools and men from old bondage and outworn theories and practices. But the potential is, so far, largely unrealized.[3]

The slow progress towards the development of usable models by which programs may be used for classroom instruction is also apparent:

> But on the whole, I think, it is safe to say that there has been no striking "breakthrough" into new levels of understanding of human learning, attributable to the study or use of programmed instruction. And perhaps this is the curve of progress we should expect — many small advances, resulting, over time, in the accumulation of insights to the size of a critical mass.[4]

We may take the importance of programmed instruction, then, as established. The second question raised here deals with the action that teachers should take if they wish to use the most effective methods of instruction available to them and, further, to know whether a new procedure such as programmed instruction provides for more effective instruction under certain classroom conditions than the procedures now being used in those contexts.

For a number of years now a widely-held belief has led many students of curriculum to advocate teacher research as the most practical and effective means for introducing innovation and improvement in educational practice. In typical action research, teachers are encouraged and assisted through workshops and inservice training to use scientific procedures in studying the problems of instruction as they appear in their own classrooms. A principal justification for teacher research stems from the observation that the effectiveness of instruction depends on the context in which it occurs. Thus one method or device may "work" with certain pupils, teachers, and schools, but not with others. Furthermore, only the teacher who must cope with particular pupils, courses of study and school facilities can decide which methods are best suited to that context. Classroom research, in this view, improves the quality of decisions that teachers must make about methodology and content. Research conducted at a greater level of generality cannot take fully into account the particular circumstances which determine what procedures constitute the most effective instructional strategy in a given classroom.

Experiments undertaken to determine the effectiveness of a new instructional device (like Cuisenaire arithmetic) would therefore have little relevance to the reality that the individual teacher must face in his own classroom:

> . . . In short, I am saying that the teacher tends to regard as valid "evidence" experiences in which she is personally involved, or in which circumstances prevail which bear considerable similarity to those in which she happens to find herself. Consequently, a much more convincing demonstration of the effectiveness of Cuisenaire instruction would result from a simpler type of experiment in which the teacher compared *her own* traditional teaching against *her own* use of Cuisenaire materials.

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1 Canadian Teachers' Federation, *A Survey of the Use of Programmed Instruction in Canadian Schools* (Ottawa: the Federation, 1963).

2 Wilbur Schramm, *The Research on Programmed Instruction* Washington: U.S. Office of Education, 1964).

3 Wilbur Schramm, *Programmed Instruction — Today and Tomorrow* (New York: the Fund for the Advancement of Education, 1962), p. ii.

4 Fund for the Advancement of Education, *Four Case Studies of Programmed Instruction* (New York: The Fund, 1964), p. 9.

> I think those of us in research have for too long neglected the psychological basis of evidence, and that we have foolishly assumed that "objective" evidence, as we understand it in the context of experimental design, has some real meaning for the teacher.[5]

On the other hand, it is increasingly apparent that traditional concepts of teaching which have rested for centuries upon direct communication between pupil and teacher are changing to include the mediation of technology between the teacher and the pupil. Since instruction has been so closely identified with intensive and direct contact between teachers and their pupils, the effectiveness of instruction has rested largely upon the personality and motivation of the persons involved.

In spheres of action where desired goals may be obtained through technological processes, achievement depends less upon the motivation of the worker than upon the nature of the device used by him. The hope of technology in education, therefore, is that new methods of instruction can be developed whose effectiveness in attaining specified educational goals is at least partly independent of the user and the context in which they are used.

This line of thought has an important implication for certain aspects of teacher research. However well motivated the teacher may be, and however intent upon using the most effective methods of instruction, every teacher cannot be expected to develop major technological breakthroughs, which come all too rarely and often only as a result of lengthy and specialized research. Teacher research is inadequate to the extent that it is limited to persuading the teacher to improve his instruction without demonstrating how that improvement may be brought about. Corey, a pioneer in teacher research, has said that teacher commitment to the methods of science is more likely to develop "from the persuasion of events than from the persuasion of men."[6] As research yields in quantity products of increasing technical complexity, teachers become less and less able to replicate in their own classrooms the same discovery processes that led to the development of such products. Teachers are, however, quite capable of *using new research products* — materials or instructional strategies of any technical complexity — provided only that they are trained in the proper use of the innovation and are given the resources necessary to adopt it in their schools. Following this line of reasoning, some exponents of teacher research regard it essentially as an instrument of communication. In this scheme of things, teacher research is used as a means to spread knowledge about, and understanding of, new research-based materials and procedures. The emphasis is placed upon conveying to teachers what Thelen calls the "central, essential principle" of an innovation so that it may be used effectively and purposively in contexts to which it is appropriate:

> Given misdiagnosis of what's important about an innovation, one can predict with some confidence the probable findings resulting from efforts to assess the value and consequences of the change. The findings in short will be inconclusive. The changes will seem to work very well in some places and not at all in others.[7]

Attempts to combine the motivational aspect of teacher research with meaningful communication about educational innovations have produced a new design for teacher involvement with research. In the demonstration or implementation project, situations are deliberately contrived in which teachers contact at first hand the products of research. The project provides not only information about the products and a demonstration of their use, but creates as well the means by which such products may be tried or tested in teachers' own schools and classrooms. Through such experiences, teachers are able to relate the realities of their particular classrooms to new materials or procedures which could arise only from research that is beyond the resources available to, or practical within, the ordinary classroom. It is in conjunction with such ideas and purposes that the CTF project on programmed instruction should be viewed.

The demonstration project, if it is effective, seeks to change teacher behaviour by implementing new procedures, materials, or ideas. It takes a research-based idea and casts it into a form which can be applied immediately and directly in the school or classroom. Many circumstances block the use of research in education. Among them resistance to change and inflexibility of the organizational system stand high. Other causes are lack of information and resources. Providing teachers with knowledge about research is not in itself sufficient to bring about change; the means themselves for change must also be provided. In this way not only does research influence practice, but at the same time conditions arise by which the dynamics of change can be studied and mobilized for the improvement of practice.

The project on programmed instruction placed in teachers' hands some of the materials, knowledge and skills needed to use programs in their classes. Through this project many teachers came into meaningful contact with a research-based procedure which otherwise would likely have remained, for some of them at least, a rather vague abstraction. Although we have no precise notion how this project changed teachers' perception of the learning process or whether it altered their practice, the results do indicate that the project provided a significant experience for many teachers. Further study is, of course, required on such projects themselves to determine how they influence teachers and to what extent they alter the conditions of teaching and learning in the classroom.

One of the significant features of such projects is that they provide a direct service for teachers. Research may too easily be directed towards organizational and administrative needs; a deliberate effort is required to channel it towards teacher needs. Given the necessary direction and resources, research of this kind can help meet the demands teachers are making upon their professional organizations for assistance with the increasingly complex problems encountered in teaching and learning. Such projects therefore

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[5] F. G. Robinson, "The Philosophy, Methodology, and Limitations of Teacher Research" in *Planning for Research: The Role of Teachers* (Ottawa: Canadian Teachers' Federation, 1964), p. 18.

[6] Stephen M. Corey, *Action Research to Improve School Practices* (New York: Teachers College, Columbia University, 1953), p. 144.

[7] Herbert A. Thelen, "New Practices on the Firing Line," *Administrator's Notebook,* 12 (5), January 1964.

have clear implications, not only for educational practice, but for the responsibility teachers' organizations have for meeting the needs and expectations of their members.

The Project

Believing that the critical examination of new techniques and proposals for instruction is essential in education, the Canadian Teachers' Federation arranged to provide programs to teachers across Canada. During September 1963, brief announcements were placed in teachers' magazines in all provinces asking teachers to make evaluations of programmed instruction. The programs available included several units excerpted from commercially prepared mathematics programs along with several short teacher-made programs in chemistry. Clearly, these programs covered only a very restricted range of topics appropriate to high school grades. Despite the narrowness of topics offered, the interest of teachers in them was high and some 200 teachers received at their request more than 35,000 programs dealing with ten copies in mathematics and chemistry. In addition to the programs themselves, the teachers were also sent several publications as background for research. One of these examined the place of programmed instruction in education[8] and another outlined procedures suitable for conducting quantitative evaluations of the effectiveness of programmed materials for instruction.[9] In addition, the teachers requesting the programs received a third publication discussing the general rationale and methodology of classroom research on curriculum and instruction.[10]

Thus, the powerful expectation was laid upon the recipients of these programs that they conduct some systematic evaluation of the effectiveness of programmed instruction or that they attempt to determine and report upon the problems encountered in using this novel means of instruction. To provide a systematic report of the results obtained by these teachers, an extensive questionnaire was sent to each participant in the project. For most teachers using the programs, a reply to this questionnaire constituted their only report to CTF on the effectiveness of the programs. Several teachers, however, made much more extensive reports of their evaluations. These teachers thus provided concrete evidence that they had on their own initiative conducted, and reported upon, full-scale evaluations which made controlled and objective assessments of programmed instruction.[11] These studies and the data gathered from the questionnaires are evidence, therefore, that teachers can be brought into meaningful contact with educational innovations if they are given the resources, the training, the opportunity and encouragement to enter such involvement. Interaction of this kind provides services not only to teachers but also to the general interest of research and school improvement.

The Programs

Ten programs were offered to teachers for their evaluation. Four of these dealt with topics in mathematics and six with topics in chemistry. Commercial publishers provided the programs in mathematics, while the chemistry programs were the work of a practicing high school teacher who had produced the programs for use in his own classes. A full description of the programs is given in Table 1. The information given in this table is the same as that given to teachers who made inquiries about the availability of programs. From this list, teachers selected programs appropriate to their classes and curriculum.

The Teachers

The response to the very modest announcements placed in the teachers' magazines during September 1963 was substantial. Almost 400 inquiries were received. Some of these were from individuals, but a number were made on behalf of groups of teachers. The actual number of programs distributed is perhaps the best measure of the use which teachers made of the programs. Table 2 contains a summary by province and program title of the programs distributed.

Not all of the inquiries resulted in a subsequent decision to use the programs, as may be seen from the fact that nearly twice as many inquiries were received as orders placed. This apparent lag was due in part to the fact that the actual programs available were devoted to a rather narrow range of topics in the high school curriculum. This selection did not, of course, suit all grades or all courses of study in various provinces. Moreover, the announcement did not reach teachers until the school year was under way. However, the fact that more than 200 teachers received and used the programs and that an almost equal number of other teachers enquired about them, shows a generous and interested response to the issue of programmed instruction and to the request to evaluate it under classroom conditions.

The Survey

A questionnaire was sent to all teachers and principals who originally contacted CTF to enquire about the nature of the programs available from CTF. It is perhaps worthy of note that these inquiries were received throughout the school year 1963-64 and well into the following year. These inquiries came, as indicated earlier, in response to a single short announcement in teachers' magazines. The size and duration of interest in the project indicate the reality of informal communication channels among teachers.

The questionnaire sent to the project participants was designed to serve several purposes. A primary and obvious purpose was to obtain teacher reactions to and evaluations of the programs. Other less obvious purposes realized through the survey required an assessment of the project itself and a description of teacher attitudes to innovation and change. To meet these purposes, the survey was designed to provide data not only about the effectiveness

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8 Canadian Teachers' Federation, *Programmed Learning and Its Future in Canada* (Ottawa: the Federation, 1961).

9 Canadian Teachers' Federation, *Evaluating Programmed Instruction Materials Through Action Research* (Ottawa: the Federation, 1963).

10 Canadian Teachers' Federation, *The Role of the Classroom Teacher in Educational Research* (Ottawa: the Federation, 1961).

11 The more extensive studies which were conducted by teachers and submitted to CTF have been published under the title *Teacher Research on Programmed Instruction: A Collection and Critique of Studies.*

Table 1. Programs Available for Evaluation by Teachers

Topic	*Publisher*	*Length of Program*	*Grade Level of Material*	*Some Suggested Possible Uses*
Signed Numbers: A traditional approach to the addition, subtraction, multiplication and division of signed numbers.	Temac — Encyclopaedia Britannica Press	500 frames (5 - 8 hours of student time)	Normally taught in Grade 9	(a) Regular instruction for students viewing work for first time (b) Remedial work for students who have not grasped the principles involved. (c) Review.
Introduction to Sets: Set terminology, union and interseciton, Venn diagrams, Cartesion product.	Temac — Encyclopaedia Britannica Press	237 frames (3 - 5 hours)	This material appears in Grade 9 in most modern mathematics programs, but it can be taught as early as Grade 7 or as late as Grade 11	(a) Regular instruction (as above). (b) Enrichment for bright students in Grades 7, 8 and 9.
Ratio, Proportion and Variation: In this unit, the student learns to compare two quantities by means of a ratio. From ratios, he is led to the setting up and solving of proportions, including problems with similar triangles, shadow problems, and lever problems. The concepts of direct and indirect variation are introduced and various word problems using these concepts are solved.	Grolier Society of Canada	357 frames (3 - 5 hours)	Material would normally be taught in Grades 9 or 10 algebra	(a) Regular instruction in Grade 9, particularly for non-academic classes. (b) Enrichment in Grades 6, 7 or 8.
Trigonometry: In this unit, the student learns the various relationships involving the sides and angles of right triangles. Given two sides, he is taught how to find the third, using the Pythagorean Theorem. The three fundamental trigonometric ratios are introduced, and the student solves many right triangles using three ratios. He learns how to use trigonometric tables. Finally, he solves many applied problems, including those bringing in the concept of angle of elevation and depression.	Grolier Society of Canada	258 frames (3 - 5 hours)	Grades 9 - 11	(a) Regular instruction, particularly a unit in trigonometry for a non-academic stream. (b) Enrichment for Grades 8 - 9 courses.
Short Programs for First Course in Chemistry: (1) Chemical Symbols (2) Valencies (3) Formulae Nomenclature of Binary compounds (4) Formulae Nomenclature of Acids and Salts (5) Other Formulae (6) Oxidation and Reduction	Teacher-Constructed: Dennis Ord	Each program has less than 100 frames	Grades 11 - 12	(a) Regular instruction. (b) Review.

of programmed instruction but about teacher attitudes and insights related to the project and to the dynamics of change in Canadian school systems.

Specifically, the purposes adopted for the study were as follows:

1. To assess the effectiveness of programs as an instructional device.
2. To assess the effectiveness of the project in familiarizing teachers with programmed instruction.
3. To assess the effectiveness of a manual on evaluation containing some basic ideas in research.
4. To assess the attitudes of teachers to innovation and experimentation.

The questionnaire sent to the participants is given in the Appendix of this report. Items on the questionnaire were built around the following topics:

1. THE RESPONDENTS:
   a. Personal characteristics.
   b. School and community characteristics.
   c. Teaching duties.
   d. Knowledge of programmed instruction and evaluation.
   e. Sources of knowledge about programmed instruction.
   f. Individual and group involvement in programmed instruction and research.
2. ASSESSMENT OF PROGRAMMED INSTRUCTION:
   a. Method of evaluation.
   b. Results of evaluation.
   c. General assessment of programmed instruction
   d. Kind of report.

The questionnaire, which appears in the Appendix, gives the particular items that define these topics.[12] Two forms of the questionnaire were prepared, one of which was mainly a shorter version of the other. The shorter form did not include items which could only have been answered by teachers who had accepted and used the CTF programs in their classrooms. Thus the two forms of the questionnaire define two groups of respondents — program "users" and "non-users". These terms will be employed later in the report to refer to these two groups. Respondents in both groups are clearly non-representative of Canadian teachers. In the first place, both groups contain teachers who were interested enough in programmed instruction to write to CTF about the project. Furthermore, the "users" were teachers who were willing and able to depart from their usual classroom procedures and to make the necessary and often extensive arrangements for working with the programs.

Many of the teachers who originally contacted CTF were acting on behalf of other teachers. Since there was no record of the number of these other teachers involved, contact with them could not be made directly. Extra questionnaires were sent to all teachers who wrote to CTF in the hopes that these would be distributed to any other teachers who were involved. Of the 369 inquiries sent to CTF about the project, 205 teachers or groups of teachers subsequently requested and used programs. Thus the two groups might be estimated as being composed of

Table 2. Programmed Instruction Inquiries and Orders

Province	Inquiries	Orders	Quantities of Programs Ordered									
			*1	2	3	4	5	6	7	8	9	10
B.C.	90	60	1568	1634	1178	1023	935	972	729	830	633	339
Alta.	29	19	788	294	437	235	233	260	270	253	229	208
Sask.	22	13	225	360	257	189	619	618	521	521	474	576
Man.	19	11	180	61	131	130	192	150	128	178	118	150
Ont.	128	63	1125	1178	1367	1351	952	1043	1264	1170	1172	1163
Que.	35	17	432	203	299	130	367	351	389	235	353	302
N.B.	25	11	225	89	181	103	115	138	115	148	115	150
N.S.	14	8	125	61	186	194	132	132	48	48	99	48
P.E.I.	2	1	36	36	—	—	80	80	80	80	80	1
Nfld.	5	2	92	92	92	82	46	12	12	12	12	12
Total	369	205	4796	4008	4128	3437	3671	3756	3556	3475	3290	2949

Total programs sent: 37,066.

*1 Signed Numbers
2 Introduction to Sets
3 Ratio, Proportion, and Variation
4 Trigonometry
5 Chemical Symbols
6 Valencies
7 Formulae Nomenclature of Binary Compounds
8 Formulae Nomenclature of Acids and Salts
9 Other Formulae
10 Oxidation and Reduction

12 In later sections of this report, the items in the questionnaire will be referred to by the number assigned to the item for purposes of machine analysis. Data on the processing cards included information other than that derived directly from the questionnaires. Thus the card column numbers do not correspond to the item numbers on the questionnaire originally sent to the participants.

205 users and 164 non-users. Of these two, the estimate for non-users may be accurate while that for users is low because of the sharing of programs among teachers as indicated above. In any case, users returned 205 questionnaires and non-users 108 questionnaires.

Analysis and Reporting

Items on the questionnaire were related to all of the four purposes stated above. Responses to these items were analyzed in two ways.

ONE-WAY ANALYSIS. The first of these methods of analysis produced response distributions for each item. Where an item occurred on both forms of the questionnaire, distributions were obtained for the users, non-users and the total of both groups. Tests were made to determine whether the distribution of responses on a given item was different as between users and non-users.[13]

A typical distribution of responses to an item is presented in Figure 1.[14] The "non-response" category included those respondents who answered the item ambiguously as well as those who failed to answer it at all.

TWO-WAY ANALYSIS. A second mode of analysis involves two-way distributions of responses to selected items. In these cases the "non-response" category is eliminated, giving a cross-analysis of responses on one item against those on another. An example for two items is given in Figure 2.

Of the 94 respondents who indicated they had done graduate work, 82 answered "yes" to item 51, one answered "no", and 11 gave the answer "uncertain". The proportions in this row are 87 per cent, 1 per cent and 12 per cent for these answers. Among the 211 respondents who indicated that they had done no graduate work, 75 per cent gave the answer "yes" on item 51, 5 per cent gave the answer "no", and 19 per cent indicated that they

Figure 1. Sample of One-Way Analysis

Have you ever done graduate study at a university for a master's or doctor's degree?	Users		Non-Users		Total	
	N	%	N	%	N	%
Yes	54	26%	42	39%	96	31%
No	148	72	64	59	212	68
Non-response	3	1	2	2	5	1
Questionnaire item 10	$X^2 = 5.47$		$.05 < p < .10$			

were "uncertain". The asterisk on the probability statement indicates that there is a significant relationship between attitude to the use of programs and training at the graduate level. For example, while 87 per cent of respondents with graduate training think that specially written programs would increase their usability, only 75 per cent of respondents without such training hold this opinion. It should be noted, too, that such findings must be interpreted with caution. Graduate training may well be related to the age and experience of teachers. Thus, the apparent attitude differences may be associated even more closely with age and experience than with graduate training. This question could be answered only with a much larger sample and more complex analysis than was available and practical for this study. This analysis does not indicate, either, whether the respondents who replied "no" or "uncertain" might have been willing to use programs even when they were not specially written for their school systems. Cautions such as these should be kept in mind when interpreting the findings reported in later sections of this report.

COLLAPSING OF CATEGORIES. In the two-way analysis described above, the number of cells in the resulting distributions was sometimes rather large. For this reason it

Figure 2. Sample of Two-Way Analysis

Have you ever done graduate study at university for a master's or doctor's degree?	If programs were written specifically for the course of studies in your school system, would you be more likely to use them than the programs presently available?							
	Yes		No		Uncertain		Total	
	N	%	N	%	N	%	N	%
Yes	82	87%	1	1%	11	12%	94	100%
No	159	75	11	5	41	19	211	100
Total	241	79%	12	4%	52	17%	305	100%
Questionnaire items 10 and 51					$X^2 = 7.62^*$		$.02 < p < .05$	

[13] The significance of differences between these and other distributions reported in the study was determined from chi-square tests of independence in contingency tables and using particularly the methods outlined by Walker and Lev; c.f., *Statistical Inference*, pp. 95 ff.

[14] The probability statement below the table indicates that the probability of obtaining such a distribution by chance lies between 5 and 10 chances out of 100. In this study, distributions having a probability of occurrence that is less than 10 chances out of 100 are accepted as significant. By this test, there is a significant relationship between the group a respondent is in and the amount of graduate training he is likely to have. While 39 per cent of non-users have graduate training, only 26 per cent of users have such training.

was decided to collapse the smaller response categories so that cells in the two-way distributions would include more cases. In this way, trends or relationships sought in the two-way analyses could be more firmly identified or rejected. Where response categories of an item were collapsed in a certain manner, this pattern was maintained whenever this item was used in other two-way tables. An example of this process may make clear the procedure followed. The original two-way table for items 54 and 6 is given in Figure 3.

Figure 3. Two-Way Analysis Using Total Number of Categories

Did you use any of the methods for evaluation outlined in material sent to you from CTF?	How many years of teaching experience have you had, counting this year?											
	1		2-5		6-14		15-28		29-36		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
I used some of the methods of evaluation outlined	2	15%	15	29%	21	32%	12	36%	2	40%	52	31%
I was unable to make use of the ideas for evaluation	6	46	20	39	15	23	10	30	2	40	53	32
I found the methods impractical for use in the classroom by teachers	1	8	3	6	4	6	2	6	—	—	10	6
I did not read the materials on evaluation	4	31	13	25	25	38	9	27	1	20	52	31
Total	13	100%	51	100%	65	100%	33	100%	5	100%	167	100%

Questionnaire items 54 and 6.

In item 54, categories 2, 3 and 4 were collapsed to give two categories, defining teachers who had or had not used the methods of evaluation outlined in the CTF materials.

In item 6, categories 1 and 2 were collapsed, as well as 4 and 5, yielding three categories instead of the previous five. These categories thus define groups of teachers with 1-5 years of experience, 6-14 years, and 15-36 years. With these combinations the 20 cells of the original table were reduced to six as shown in Figure 4.

Figure 4. Two-Way Analysis Using Collapsed Categories

Did you use any of the methods for evaluation outlined in material sent to you from CTF?	How many years of teaching experience have you had, counting this year?							
	1-5		6-14		15-36		Total	
	N	%	N	%	N	%	N	%
Used some of the methods of evaluation	17	27%	21	32%	14	37%	52	31%
Was unable to use the ideas for evaluation, found the methods impractical, or did not read the materials on evaluation	47	73	44	68	24	63	115	69
Total	64	100%	65	100%	38	100%	167	100%

Questionnaire items 54 and 6.

The remainder of this report is concerned with reporting the data obtained in the survey. One chapter deals with the characteristics and background of teachers participating in the survey, while the remaining sections deal with findings related to the four specific purposes for which the survey was designed.

CHAPTER TWO

BACKGROUND OF THE PROJECT PARTICIPANTS

BACKGROUND OF THE PROJECT PARTICIPANTS

Information on the background of participants dealt with professional status and teaching duties in their schools and communities. The tables in this chapter describe each of two participant groups separately and give, as well, composite results for the combined groups. Each table contains the results of a test made to determine the similarity between the groups of "users" and "non-users" of the programs. As explained in the previous chapter, non-users were defined as those teachers who, although they expressed interest in the available programs, did not subsequently use them with pupils. Users were those teachers who ordered programs from those available and used them for instructional purposes in their classrooms.

Columns in the one-way tables sum to the total number of respondents in each group of 205 and 108 respectively.

Professional Status

The professional status of teachers in the survey was inferred from data concerning the extent of their teaching experience and academic preparation.

As indicated in Table 3, non-users were more experienced than users. The median experience of users was 8.5 years, while that of non-users was 13.5. The more extensive experience in the groups of non-users indicates also that users were somewhat younger than non-users.

Table 3. Teaching Experience of Survey Participants

How many years of teaching experience have you had, counting this year?	Users N	Users %	Non Users N	Non Users %	Total N	Total %
1 year	15	7%	9	8%	24	7%
2- 5 years	58	28	23	21	81	26
6-14 years	78	38	32	32	110	35
15-28 years	45	22	31	29	76	24
23-36 years	9	4	12	11	21	7
Non response			1	1	1	1
Questionnaire item 6	$X^2 = 10.854$*		.02 < p < .05			

Tables 4 and 5 describe the academic background of teachers in the two groups. Significant differences appeared in the amounts of graduate study undertaken. Non-users were more apt to have some graduate training than were users. A similar trend is also apparent in regard to undergraduate training, although by far the largest part of both groups had bachelor's degrees.

Table 4. Degrees Held by Survey Participants

Do you hold a bachelor's degree from a university?	Users N	Users %	Non-Users N	Non-Users %	Total N	Total %
Yes	169	82%	95	88%	264	84%
No	36	18	13	12	49	16
Questionnaire item 9	$X^2 = 2.53$		.10 < p < .20			

Table 5. Graduate Study by Survey Participants

Have you ever done graduate study at a university for a master's or doctor's degree?	Users N	Users %	Non-Users N	Non-Users %	Total N	Total %
Yes	54	26%	42	39%	96	31%
No	148	72	64	59	212	68
Non-response	3	1	2	2	5	1
Questionnaire item 10	$X^2 = 5.47$*		.05 < p < .10			

In regard to professional status, then, non-users appeared more extensively experienced and trained than users.

School and Community Setting

The distributions by sizes of schools in which participants taught are presented in Table 6. The range of school sizes extended from the smallest to some of the largest. The median number of teachers in users' schools was 24.5 and in those of non-users was 23.5. Both groups apparently come from schools within similar ranges of sizes. On the whole, therefore, the teachers in both groups were drawn from schools of moderate size.

Table 6. School Size

How many teachers are there in your school?	Users N	Users %	Non-Users N	Non-Users %	Total N	Total %
1- 5 teachers	13	6%	6	5%	19	6%
6- 17 teachers	48	23	29	27	77	25
18- 38 teachers	68	33	48	44	116	37
39- 69 teachers	57	28	18	17	75	24
70-120 teachers	15	7	6	5	21	7
Non-response	4	2	1	1	5	1
Questionnaire item 7	$X^2 = 7.295$		.10 < p < .20			

Table 7 describes the size of communities in which survey participants were located. Both groups came from communities of similar sizes, although clearly teachers from the smaller communities are more fully represented than are those from larger centers. Only 43 per cent of teachers in the total group were located in the larger urban centres.

* Each table is followed by a probability statement derived from a chi-square test of independence. The distributions are considered to be independent when p is less than .10. Probabilities of this size are taken to indicate real rather than chance differences between the two distributions. In subsequent tables, the asterisk indicates a significant difference between the groups defined in the table in respect to their responses to various items on the questionnaire.

Table 7. Community Size

What is the size of the community in which your school is located?	Users N	Users %	Non-Users N	Non-Users %	Total N	Total %
Rural area or small town (population under 500)	22	11%	8	7%	30	10%
Village or town (population under 1000)	11	5	11	10	22	7
Town (population 1001-5000)	44	21	24	22	68	22
Large town (population 5001-20,000)	38	19	19	18	57	18
Small city (population 20,001-50,000)	28	14	13	12	41	13
City or its suburbs (population of city and suburbs 50,001-200,000)	20	10	14	13	34	11
Metropolitan area or its suburbs (population of area and suburbs over 200,000)	41	20	17	16	58	19
Non-response	1	1	2	2	3	1
Questionnaire item 8			$X^2 = 6.09$		$.30 < p < .50$	

Teaching Duties

Data on the teaching duties of the survey participants include information on their subject specialization, grade assignments and administrative responsibilities. The teachers in the two groups had similar subject assignments, as is apparent in Table 8. The programs available to teachers were offered only in mathematics and chemistry; the concentration in teaching time in these two subjects reflects this selection.

Table 8. Subject Specialization of Survey Participants

On what subject do you spend the largest proportion of your teaching time?	Users N	Users %	Non-Users N	Non-Users %	Total N	Total %
Mathematics	99	48%	41	38%	140	45%
Chemistry	30	15	15	14	45	14
Physics	8	4	8	7	16	5
Biology	5	2	6	6	11	4
English	7	3	6	6	13	4
Foreign Languages	1	—	1	1	2	1
Social Studies, History or Geography	1	—	6	6	7	2
Other	26	13	19	18	45	14
Non-response	28	14	6	5	34	11
Questionnaire item 11			$X^2 = 3.187$		$.90 < p < .95$	

Table 9. Grade Assignments of Survey Participants

In what grade do you spend the largest proportion of your teaching time?	Users N	Users %	Non-Users N	Non-Users %	Total N	Total %
Below Grade 8	3	1%	4	4%	7	2%
Grade 8	15	7	2	2	17	5
Grade 9	27	13	9	8	36	12
Grade 10	27	13	13	12	40	13
Grade 11	30	15	22	20	52	17
Grade 12	41	20	23	21	64	20
Grade 13	16	8	12	11	28	9
Other	9	4	5	5	14	4
Non-response	37	18	18	17	55	18
Questionnaire item 13			$X^2 = 9.407$		$.30 < p < .50$	

The grade assignments of survey participants are given in Table 9. Both groups had similar assignments in this regard and both reflect the emphasis in the programs themselves on content appropriate to the senior grades.

The administrative responsibilities of teachers in the two groups showed markedly different patterns. Non-users were more likely to hold a principalship. Users, if they held an administrative post, were most likely to be department heads. This item had no response appropriate to the classroom teacher. Thus the large non-response rate likely indicates teachers who, having no administrative responsibilities, could not answer the item. Another significant feature of the response patterns is the large number of respondents who reported one kind of administrative responsibility or another. In both groups, more than 50 per cent of the participants indicated that they had such responsibilities. Survey participants might thus be described as activists in their schools, or as persons willing to take on extra or special tasks. The administrative responsibilities of the participants are reported in Table 10.

Table 10. Administrative Responsibilities of Survey Participants

Do you have major administrative responsibilities in this school besides your teaching duties?	Users N	Users %	Non-Users N	Non-Users %	Total N	Total %
Principal	16	8%	27	25%	43	14%
Vice-Principal	13	6	9	8	22	7
Department Head	38	19	12	11	50	16
Counsellor	11	5	7	6	18	6
Teachers' Representative	13	6	2	2	15	5
Other	22	11	9	8	31	10
Non-response	92	45	42	39	134	43
Questionnaire item 12			$X^2 = 18.50^*$		$p < .01$	

Summary

This chapter has considered the professional status, school and community setting and teaching duties of teachers involved in the survey.

Users of the programs were less experienced than non-users and had less extensive graduate training. Most teachers in both groups possessed bachelor's degrees.

Both users and non-users were drawn from moderately-sized schools, although the range in both groups extended from very small to large schools. Teachers from large urban centers were less frequently represented than teachers from smaller communities.

The participants were largely teachers of mathematics and chemistry in the senior grades. Many had administrative duties of some kind, although non-users were likely to be principals rather than classroom teachers.

CHAPTER THREE

TEACHERS AND PROGRAMMED INSTRUCTION

TEACHERS AND PROGRAMMED INSTRUCTION

As one of its purposes, the project aimed to familiarize teachers with programmed instruction. This section of the report deals with the findings relevant to that purpose. The findings in this regard will be discussed under three headings: knowledge of programming, sources of knowledge, and uses of knowledge.

Knowledge of Programming

Two items on the questionnaires sought information about the respondents' knowledge of programming. Respondents were asked further to provide this information for two separate times. They were asked first for their knowledge *before* the project began (i.e., in August 1963) and for their knowledge *after* the project (i.e., at the time of the survey or "now" as worded on the questionnaire). One of the items asked whether the respondents recognized several terms associated with programmed instruction. The terms used were the following: branching, frame, stimulus-response and small steps. As a check, the term "grid space", which has no meaning in the context of programmed instruction, was also included in the list. In the following tables, the response "Yes-Yes" indicates that the respondents claimed familiarity with that term both before and after the project. A response "No-Yes" indicates the respondents who gained familiarity with a term during the project. The response "No-No" indicates respondents who were familiar with the term neither before nor after the project.

Because the response patterns for both users and non-users closely resembled each other, only the responses for the total groups are given on these items. Table 11 summarizes the respondents' knowledge of the five terms.

A second item on the questionnaires asked respondents about their familiarity with certain names associated with programmed instruction. The names used were Skinner, Crowder, Pressey and Stolurow. The fictitious name Fisker was also included in the list as a further reliability check on the respondents' knowledge claims. The results of those items are summarized in Table 12.

Tables 11 and 12 indicate that many participants were familiar with the terms associated with programmed instruction before the project began. For example, 51 per cent were familiar with the term "frame" and 44 per cent with "small steps". For the same two terms 17 and 12 per cent respectively claimed to have gained familiarity during the course of the project (i.e., between "August" and "Now"). In general, the respondents were more familiar with the terms than with the names. Very little explicit information distributed in the course of the project was directed at producing familiarity with these names and terms. Thus, even considering that the project attracted many participants who were already familiar with programmed instruction, involvement in the project increased the knowledge of a substantial number of participants.

The increased knowledge is indicated, too, in a comparison of the total number of terms familiar in "August" and "Now" (at the time of the survey). This increase is summarized in Table 13, where the significantly changed knowledge is apparent.

Table 11. Knowledge of terms in Programmed Instruction

	Terms									
Response	Branching		Frame		Stimulus Response		Small Steps		Space Grid	
August / Now	N	%	N	%	N	%	N	%	N	%
Yes Yes	91	29%	159	51%	162	52%	138	44%	32	10%
No Yes	31	10	52	17	28	9	38	12	21	7
No No	101	32	29	9	52	17	58	19	145	46
Other	28	9	32	10	30	9	33	10	31	10
Non-response	62	20	41	13	41	13	46	15	84	27

Questionnaire items 23-30

Table 12. Knowledge of Names in Programmed Instruction

	Names									
Response	Skinner		Crowder		Pressey		Stolurow		Fisker	
August / Now	N	%	N	%	N	%	N	%	N	%
Yes Yes	122	39%	58	19%	58	19%	8	3%	4	1%
No Yes	32	10	22	7	13	4	2	1	3	1
No No	80	26	132	42	143	46	182	58	179	57
Other	28	9	35	11	27	9	30	10	30	10
Non-response	51	16	66	21	72	23	91	29	97	31

Questionnaire items 31-38

A similar increase in participants' knowledge of names associated with programmed instruction may be noted in Table 14. The increase in this case is less striking than the change observed in participants' familiarity with the terminology of programmed instruction.

The results of the reliability check are summarized in Table 15. In this check, the respondents were asked to indicate whether they were familiar with the term "grid space" or the name "Fisker". The table indicates the number of respondents who claimed familiarity with these either before or after the project.

Table 13. Increased Knowledge of Terms in Programmed Instruction

Number of Terms	Terms familiar to respondents in August 1963 (excluding "grid-space" at both times) N	%	Terms familiar to respondents "now" (excluding "grid-space" at both times) N	%
0-1	96	35%	64	24%
2-3	92	34	104	38
4	84	31	104	38
Total	272	100%	272	100%
Questionnaire items 23-30	$X^2 = 9.2$*		$.01 < p < .02$	

Relatively few respondents claimed familiarity with either of the bogus terms used as reliability checks. It is clear, though, that a large enough number may have done so to bias the estimate of increased knowledge in regard to the other terms. Thus the finding that the project increased participants' knowledge of programmed instruction should be interpreted with caution. The best indication that some change in knowledge did take place came from the fact that only two participants claimed familiarity with the fictitious name, Fisker; the honesty of this response leaves unclouded the obvious shift in their claims to familiarity with the other non-fictitious names. Similarly, although 15 per cent claimed to know the term "grid-space", there may still have been a real shift in regard to the other terms legitimately associated with programmed instruction.

Sources of Knowledge

The survey attempted to discover what sources teachers used to find out about programmed instruction in general and about the project in particular. Sources of the teachers' information about the project are summarized in Table 16. Most teachers first heard of the project through the initial announcement placed in the teachers' magazines. Significantly, however, the next most important source was personal recommendation by another teacher. Including information provided by supervisors, nearly one-quarter of the participants first heard of the project through personal recommendation.

In regard to these sources, it is important to note too that there are differences in the patterns of sources for users and non-users. Non-users were more likely to have discovered of the project by *reading* about it while users were more likely to have *heard* about it through personal recommendation.

Table 14. Increased Knowledge of Names in Programmed Instruction

Number of Terms	Names familiar to respondents in August 1963 (excluding "Fisker" at both times) N	%	Names familiar to respondents "now" (excluding "Fisker" at both times) N	%
0-1	169	69%	154	60%
2-3	69	28	93	36
4	6	3	10	4
Total	244	100%	257	100%
Questionnaire items 31-38	$X^2 = 4.92$*		$.05 < p < .10$	

Table 15. Reliability Check for Increased Knowledge

Response	Term or Name: "Grid-space" N	%	"Fisker" N	%
No	173	55%	207	66%
Yes	47	15	2	1
Non-response	93	30	104	33
Questionnaire items 29, 38				

Table 16. Source of Knowledge About the Project

How did you first learn of the project in programmed instruction being carried on by CTF?	Users N	%	Non-Users N	%	Total N	%
Read a notice in a teachers' journal	123	60%	80	74%	203	65%
Read an announcement at a meeting or conference	12	6	9	8	21	7
Recommended to me by another teacher	34	17	6	6	40	13
Recommended to me by a supervisor (principal, inspector, etc.)	21	10	6	6	27	9
Other	11	5	5	5	16	5
Non-response	4	2	2	2	6	2
Questionnaire item 14			$X^2 = 11.43$*		$.02 < p < .05$	

* In this and subsequent tables the asterisk indicates a significant difference between the groups defined in the table in respect to their responses to various items on the questionnaire.

Teachers who had previously handled programmed instruction composed nearly one-quarter of the users. Thus previous experience with programs constituted an important source of knowledge and likely a strong disposition to use other programs. The extent of teachers' previous experience with programs is summarized in Table 17.

Table 17. Previous Experience with Programs

Have you used programme materials other than those supplied through CTF for the instruction of pupils in your classes?	Users N	Users %
Have never used programs except those from CTF	148	72%
Have used programs other than those sent by CTF	48	23
Non response	9	4

Questionnaire item 48

Despite the size of this previously experienced group, the majority of teachers in the project were inexperienced with programs but clearly willing to depart from standard classroom procedures to use a new and to them unfamiliar means of instruction. This item was not asked of non-users, although it may be supposed that the numbers of them having past experience with programs would have been smaller than among users.

The survey also attempted to define what source in the literature had provided teachers with information about programmed instruction. Thus teachers were asked to indicate their familiarity with a number of journals and publications. Those listed were as follows:

1. Any magazine published by a provincial teachers' organization.
2. Any journal sponsored by a provincial specialist teachers' council.
3. *AV Communication Review*
4. *Educational Research*
5. *Theory into Practice*
6. *Phi Delta Kappan*
7. *Programmed Learning and Its Future in Canada*
8. *Evaluating Programmed Instruction Materials Through Action Research*
9. Other journals and publications.

The publications listed seventh and eighth above were sent to most participants in the project. A few who wrote in near the end of the year did not receive these publications as supplies were exhausted by that date. The importance of the second of these two publications for evaluation procedures was pointed out to the project participants. The extent to which participants indicated familiarity with these sources is apparent in Table 18.

Data were collected for both users and non-users. However, with one exception, the distributions for the two groups were similar and therefore only data for the total group are given.

The largest single source of teachers' information about programmed instruction was their own magazines. By and large, the sources in the general education literature such as *Phi Delta Kappan* and *Educational Research* were not much used, despite the fact that both of these journals are written with the practitioner specifically in mind. The two CTF publications, *A Survey of the Use of Programmed Instruction in Canadian Schools 1962-63* and *Evaluating Programmed Instruction Materials Through Action Research,* were read by about one-quarter of the group. In this regard, there was a significant difference between users and non-users. Among those who used the programs, 29 per cent had read the manual on evaluation, while only 22 per cent of the non-users had done so. Apparently, use of the programs was a motivation for study on the problem of evaluation. It might be pointed out, in connection with these two publications, that the

Table 18. Sources in Journals and Publications

	Have you read about programmed instruction in any of the following publications?									
	Teachers' Magazines		Specialist Magazines		"AV Review"		"Educational Research"		"Theory into Practice"	
Response	N	%	N	%	N	%	N	%	N	%
Yes	234	75%	64	20%	19	6%	60	19%	5	2%
No	36	12	121	39	150	48	127	41	155	50
Non-response	43	14	128	41	144	46	126	40	153	49

	"Phi Delta Kappan"		"Programmed Learning"		"Evaluating Programmed Instruction Materials"		Other	
Response	N	%	N	%	N	%	N	%
Yes	25	8%	73	23%	83	27%	58	19%
No	146	47	120	38	108	35	57	18
Non-response	142	45	120	38	122	39	198	63

Questionnaire items 39-47.

teachers received them and presumably read them several months before the survey was made. It is possible, therefore, that participants failed to recognize their titles among the other unfamiliar journals.

Uses of Knowledge

Do teachers with varying amounts of knowledge about programmed instruction view it in different ways? Does knowledge influence the means teachers use to evaluate programmed instruction? Some evidence to answer these questions may be obtained by comparing the amount of knowledge claimed by teachers and their assessments of programmed instruction. Tables 19 to 22 below present comparisons using the items on the questionnaires concerning the teachers' familiarity with programmed instruction and their behaviour and attitudes towards it. These tables all present similar trends indicating that teachers having different degrees of knowledge acted differently to evaluate the programs and held different views on their general effectiveness. The relationship between knowledge and behaviour or attitude is clearly complex as summarized in these tables. In general, though, teachers with greater knowledge made more careful evaluations of the programs and held the most optimistic views about their uses and value.

Table 19 presents a two-way comparison of knowledge (as measured by familiarity with terms in programmed instruction) and method of evaluation used. Response categories in item 55 have been collapsed to create cells designating respondents who either did or did not use controlled comparisons of pupil achievement. Although the relationship is not linear, teachers with greater knowledge were more likely to use control groups than those with less knowledge.

Table 19. Knowledge of Terms in Programmed Instruction and Use of Control Groups

Number of programmed instruction terms[1] with which respondents claimed familiarity at time of survey ("now")	No Control Group Used		Control Group[2] Used		Total	
	N	%	N	%	N	%
0-1	22	73%	8	27%	30	100%
2-3	23	40	34	60	57	100
4	32	56	25	44	57	100
Total	77	53%	67	47%	144	100%
Questionnaire items 29 and 55	$X^2 = 8.82^*$		$.02 < p < .01$			

Table 20. Knowledge of Names Associated with Programmed Instruction and Measures of Achievement Used

Basis used to assess the effectiveness of programmed instruction	Number of names associated with programmed instruction[3] with which respondents claimed familiarity at time of survey ("now")							
	None		1-2		3-4		Total	
	N	%	N	%	N	%	N	%
Rating of effectiveness by pupils and/or teachers	25	63%	17	35%	14	50%	56	48%
Comparison of pupils in different groups, writing same or different examinations, or other method	15	37%	32	65%	14	50%	61	52%
Total	40	100%	49	100%	28	100%	117	100%
Questionnaire items 56 and 37					$X^2 = 6.89^*$		$.02 < p < .05$	

Table 21. Knowledge of Terms in Programmed Instruction and General Assessment of Effectiveness

Teacher assessment of programmed instruction	Number of programmed instruction terms[4] with which respondents claimed familiarity at time of survey ("now")							
	0-1		2-3		4		Total	
	N	%	N	%	N	%	N	%
Highly effective under some or most classroom conditions	24	46%	42	45%	59	65%	125	53%
Effective only for very specialized purposes, or largely ineffective	28	54	51	55	31	35	110	47
Total	52	100%	93	100%	90	100%	235	100%
Questionnaire items 68 and 29					$X^2 = 8.97^*$		$.01 < p < .02$	

[1] Terms: branching, frame, stimulus-response, small steps.
[2] Types of control: one class divided into groups, separate classes taught by same or different teachers, class(es) of this year compared with class(es) of a previous year.
[3] Names: Skinner, Crowder, Pressy, Stolurow.
[4] Terms: branching, frame, stimulus-response, small steps.

Table 20 presents a similar comparison between knowledge and methods used for measuring pupil gain. Teachers with the least knowledge were apt to use a rating of achievement while those with greater knowledge used comparisons of achievement.

Table 21 compares teachers' knowledge with their general assessments of the effectiveness of programmed instruction. In this case the trend indicates that teachers with greater knowledge regard programmed instruction as more effective than do teachers with less knowledge.

Table 22 shows a similar though less clearly defined relationship between teachers' knowledge and their concept of the role of programs in classroom instruction. Teachers with less knowledge tend to see programs as occupying the peripheral roles in instruction while teachers with greater knowledge see programs as fulfilling the more central and fundamental tasks of instruction.

Table 22. Knowledge of Terms in Programmed Instruction and Perceived Role

Purposes for which respondents judged programmed instruction to be most effective	Number of programmed instruction terms[1] with which respondents claimed familiarity at time of survey ("now")							
	0-1		2-3		4		Total	
	N	%	N	%	N	%	N	%
As replacement for usual classroom instruction by a teacher	4	8%	7	8%	4	5%	15	6%
A supplement to usual classroom instruction by a teacher	24	46	50	55	58	65	132	57
As remedial instruction for selected pupils	24	46	34	37	27	30	85	37
Total	52	100%	91	100%	89	100%	232	100%
Questionnaire items 69 and 29						$X^2 = 5.34$	$.20 < p < .30$	

1 Terms: branching, frame, stimulus-response, small steps.

Summary

This chapter has considered findings related to the impact of the project upon the extent, sources, and use of teachers' knowledge about programmed instruction.

In regard to the extent of teachers' knowledge it was found that many participants were familiar with terms and names associated with programmed instruction. Despite the extensive pre-knowledge, a significant increase in participants' familiarity with these terms and names occurred during the project. This increase is particularly noteworthy since the materials provided to the participants did not aim directly at improving knowledge about programmed instruction. Reliability checks on increases in partcipants' knowledge indicated some possible inflation in estimates of the observed increases but generally confirmed the respondents' claims of greater familiarity.

The sources of knowledge about the project and programming were largely the teachers' own professional journals. Personal recommendation provided an important contact with the project, particularly among users; non-users were less likely to have first heard of the project through personal recommendation.

The publications distributed by CTF formed another important source of information about programmed instruction, although a surprisingly large number of participants failed to mention this source. Users were more likely to have tapped this source than non-users. The general and now more extensive professional literature formed only a comparatively insignificant source of teachers' knowledge about programmed instruction.

Significant relationships were identified between the extent of teachers' knowledge and their evaluations of and attitudes to programmed instruction. In general, teachers with greater knowledge made more objective evaluations of the programs and held the most optimistic attitude to programs as an instructional device. The more knowledgeable teachers felt programs were appropriate to more fundamental instructional roles, while the less knowledgeable assigned them to peripheral tasks.

CHAPTER FOUR

TEACHERS AND EVALUATIVE PROCEDURES

TEACHERS AND EVALUATIVE PROCEDURES

The second purpose of the survey was to assess the impact of the project upon the procedures used by participants as they went about evaluating the programs. In particular, the study aimed to determine the usefulness of the evaluation manual which was distributed with the programs.[1] The manual sent to teachers was intended as a guide for assessing the effectiveness of programmed instruction. The procedures described and advocated in the manual were deliberately oriented to conditions commonly found in schools and classrooms. Two basic ideas in evaluation were stressed in the manual — controlled observations and objective measurement. The manual and other materials sent to participants implied strongly that evaluations based upon such procedures gave sounder information and led to better decisions than the common evaluative procedures based upon uncontrolled and non-objective observation.

The manual discussed problems in establishing control groups, examined practical methods for matching or randomizing pupils within groups, and suggested some approaches to objective measurement. Discussion of or instruction in statistical techniques did not form a large part of the materials sent to the participants. Emphasis was placed rather upon acquainting teachers with the logic of controlled evaluation and to this end simple designs were advocated which permitted comparison of main effects between a programmed instruction group and a teacher instruction group.

This section presents findings concerning teacher familiarity with and use of these ideas in evaluation. It also presents the findings relating to the interaction of teachers' knowledge of evaluation and their use of the manual on evaluation.

Knowledge of Evaluation

One item on the questionnaire sent to users asked them to state whether they were familiar with certain terms in evaluation and research. Respondents indicated whether they knew the terms before the project (in August 1963), after the project ("now") or at neither of these times. The number of respondents stating that they knew the terms after the project but not before provides a measure of the impact of the project upon teachers' knowledge of evaluation. Table 23 summarizes the participants' knowledge of certain terms in evaluation and research.

In this item, as in some of the other items seeking information about participants' knowledge, there is a rather large non-response rate. This situation may be due to the complexity of the items themselves, but variations in this rate suggest that non-response is also a means of indicating a negative reply. For example, the two most widely recognized terms were "standard deviation" and "significant difference". These terms had also the lowest non-response rates.

In general, however, the responses to this item indicate that knowledge about research and evaluation was widespread among the participants. It might be that such knowledge would be tantamount to a prerequisite to participation. Clearly for more than half of the group the manual and other information sent to them could impart little information about evaluation that was totally new to them. It may, however, have acted as a stimulant for them to use their knowledge by casting it into forms readily usable in their classrooms. Information on the non-participants' knowledge in this area was not collected, although it has already been noted that users were more likely than non-users to have read the special materials.

The number of participants who reported familiarity with the terms after the project, but not before it, was small in each case. No more than seven per cent reported increased familiarity. This same finding is borne out when the number of terms familiar to respondents before the project is compared with the number reported after the project. These findings are summarized in Table 24. In general, therefore, these data produce no evidence that the project or the special materials increased the participants' knowledge about research and evaluation. This result may be explained by the high level of knowledge which teachers possessed before they embarked on the project and by the fact that the survey could not measure

[1] The manual distributed was that entitled *Evaluating Programmed Instruction Materials Through Action Research.* For further comment on the organization of the project, see Chapter One of this report.

Table 23. Knowledge of Terms in Evaluation and Research

Response August/Now		Are you familiar with the following terms in evaluation and research?							
		Randomization		Matching of Groups		Standard Deviation		Significant Difference	
		N	%	N	%	N	%	N	%
Yes	Yes	107	52%	120	58%	138	67%	128	62%
No	Yes	14	7	7	3	8	4	10	5
No	No	45	22	40	20	28	14	37	18
Other		—	—	1	1	1	1	—	—
Non-response		39	19	37	18	30	15	30	15

Questionnaire items 60-65

whether the project had changed the teachers' perception of their knowledge, their opinion of its usefulness, or their motivation to use it.

The Use of Evaluative Techniques

The tables in this section indicate the extent to which the project participants made specific evaluations of the programs and provide as well information about the kind and quality of the evaluations which were made. Of the 205 respondents about half, or 103 teachers, indicated that they made some specific evaluation of the programs they received. This finding is given in Table 25.

Table 24. Change in Knowledge About Research and Evaluation

Number of terms familiar to respondents	August		"Now"	
	N	%	N	%
0	21	10%	19	9%
1	6	3	6	3
2	23	11	17	8
3	32	16	28	12
4	90	44	88	43
Non-response	33	16	50	24

Questionnaire items 60-65

Table 26 summarizes the extent to which use was made of the methods of evaluation suggested in the special materials sent from CTF. About one-quarter of the users employed the evaluative techniques advocated, while an equal proportion reported they were unable to use the methods suggested. Another third did not read the materials or found them impractical.

The large number of teachers who did not make an evaluation apparently interpreted evaluation as the use of controlled observation. At least some 45 per cent of the respondents reported that no control groups were used and this figure corresponds closely to the number indicating that no evaluation was made. This interpretation was substantiated by the materials sent to the participants. This material encouraged the teachers to view "research" as a process which requires a teacher to go beyond the usual procedures used in the classroom for evaluation.

Table 27 summarizes the kinds of control groups used in the evaluations. Approximately 35 per cent of the respondents reported some use of comparison groups. As a measure of the effectiveness of programmed instruction, a rating of effectiveness was the most commonly used criterion. Comparisons of pupil achievement were used as criteria by a group almost as large as that using ratings. The approach taken in the project material sent to participants emphasized the use of objective measures of effectiveness. Although the actual number using objective criteria was small in comparison to the total number using the programs, this degree of objective measurement represents a substantial change from the standard evaluative practices of the classroom. Such objectivity in regard to an instructional innovation may represent, too, a significant attempt at objective appraisal that many other older innovations now accepted in school practice never received. The findings about the criteria of effectiveness are given in Table 28.

Table 25. Extent of Teacher Evaluation

Did you make an evaluation of the effectiveness of programmed instruction?	Users	
	N	%
Yes	103	50%
No	90	44
Non-response	12	6

Questionnaire item 53

Table 26. Use of Evaluation Methods

Did you use any of the methods for evaluation outlined in materials sent to you from CTF?	Users	
	N	%
I used some of the methods of evaluation outlined	52	25
I was unable to make use of the ideas for evaluation	53	26
I found the methods impractical for use in the classroom by teachers	10	5
I did not read the materials on evaluation	52	25
Non-response	38	19

Questionnaire item 54

TABLE 27. Kinds of Evaluation Used

What comparison or "control" group did you use in your evaluation?	Users	
	N	%
No comparison groups used	92	45%
One class divided into groups	15	7
Separate classes taught by the same teacher	27	13
Separate classes taught by different teachers	14	7
Class(es) of this year compared to class(es) of a previous year	11	5
Other	11	5
Non-response	35	17

Questionnaire item 55

Table 28. Criteria for Assessing Effectiveness

What basis was used to assess the effectiveness of programmed instruction?	Users	
	N	%
A rating of effectiveness by pupils and/or teachers	66	32%
A comparison of pupil achievement in different groups	49	24
A comparison of pupil achievement in different groups writing different examinations	3	1
Other	22	11
Non-response	65	32

Questionnaire item 56

Table 29. Assignment of Pupils to Groups

If comparison groups were used, how were pupils in them assigned to particular groups?	Users	
	N	%
No special arrangement of pupils other than the grouping procedures usually followed in the school	71	35%
Pupils were randomly assigned to classes for the evaluation	3	1
Pupils were matched and randomly assigned to classes for the evaluation	14	7
Non-response	117	57

Questionnaire item 57

In regard to the assignment of pupils to the comparison or control groups, Table 29 presents some findings. Only a small proportion of the group was able to assign pupils to the groups by matching or randomization. The other comparisons were presumably made between groups constituted on some basis other than the requirements for controlled observation.

Knowledge and the Use of the Manual

How did teachers react to the manual on evaluation which was specifically prepared to suggest designs for assessing the effectiveness of the programs? Was a certain level of knowledge necessary on the part of teachers for them to use the manual? Some evidence to answer these questions is presented in the following three tables. It may be noted in these tables that teachers who had a greater knowledge of the terminology of programming and of research and those who had a greater knowledge of programmed instruction itself were more likely to have read the manual than were teachers having less of such knowledge. In each of these tables, groups that read or did not read the manual are compared as to their knowledge of programming and evaluation. In Table 30, over one-half of the group that read the manual reported the highest degree of familiarity with terms in programmed instruction. Of the group that had not read the manual, only 16 per cent reported a similar degree of familiarity. Similar relationships hold in Tables 31 and 32 where the measures of knowledge are familiarity with terms in research and names associated with programmed instruction.

These findings suggest that the materials on evaluation required a high level of knowledge in readers before they could be useful to them. Clearly, other materials which presumed less pre-knowledge on the part of readers were needed for a large number of participants.

Table 30. Use of the Manual and Knowledge of Terms in Programmed Instruction

	Number of programmed instruction terms[1] with which respondents claimed familiarity in August 1963							
	None		1-3		4		Total	
	N	%	N	%	N	%	N	%
Persons who read manual[2]	9	11%	29	36%	43	53%	81	100%
Persons who did not read manual	31	31	52	53	16	16	99	100
	40	22%	81	45%	59	33%	180	100%

Questionnaire items 54 and 23-30 $X^2 = 29.4^*$ $.01 < p$

[1] Terms: branching, frame, stimulus-response, small steps.

[2] *Evaluating Programmed Instruction Materials Through Action Research.*

Table 31. Use of the Manual and Knowledge of Terms in Research and Evaluation

	Number of research and evaluation terms[1] with which respondents claimed familiarity in August 1963							
	None		1-3		4		Total	
	N	%	N	%	N	%	N	%
Persons who read manual[2]	2	3%	3	5%	54	92%	59	100%
Persons who did not read manual	8	15	10	19	34	66	52	100
	10	9%	13	12%	88	79%	111	100%

Questionnaire items 54 and 60-65 $X^2 = 9.14^*$ $.02 < p < .01$

[1] Terms: randomization, matching of groups, standard deviation, significant difference.

[2] *Evaluating Programmed Instruction Materials Through Action Research.*

* In this and subsequent tables the asterisk indicates a significant difference between the groups defined in the table in respect to their responses to various items on the questionnaire.

Table 32. Use of the Manual and Knowledge of Names Associated with Programmed Instruction

	Number of names associated with programmed instruction[1] with which respondents claimed familiarity in August 1963							
	None		1-2		3-4		Total	
	N	%	N	%	N	%	N	%
Persons who read manual[2]	25	32%	26	34%	26	34%	77	100%
Persons who did not read manual	52	55	35	37	8	8	95	100
	77	45%	61	35%	34	20%	172	100%
Questionnaire items 54 and 31-38							$X^2 = 17.50$	$.01 < p$

[1] Names: Skinner, Crowder, Pressey, Stolurow.

[2] *Evaluating Programmed Instruction Materials Through Action Research.*

Summary

This chapter has dealt with the evaluative procedures used by the project participants and the impact of the project upon the extent and level of procedures used.

Most participants possessed a broad general knowledge of evaluation before they became involved in the project. There was no evidence, as in the case of knowledge about programming, that the project had the effect of increasing the participants' knowledge of evaluation.

In regard to the use of the recommended evaluation procedures, it was found that only about one-half of the users made a specific evaluation of the programs. About one-third of the users employed the techniques of controlled comparison recommended in the materials sent as a guide for evaluating the programs. Another quarter of the group reported that the recommended procedures were not feasible in their situations. About one-third of the group did not read the materials on evaluation. A rating of effectiveness was the most common criterion for assessing the programs, although one-quarter of the users employed some form of pupil achievement as criteria of effectiveness. Very few participants were able to assign pupils to groups on a random basis or to establish matched control groups.

Finally it was apparent that those teachers who read the manual and (presumably) used the evaluation techniques described there were teachers who already possessed extensive knowledge of programmed instruction and research.

CHAPTER FIVE

TEACHER EVALUATION OF PROGRAMMED INSTRUCTION

TEACHER EVALUATION OF PROGRAMMED INSTRUCTION

Project participants provided two kinds of information about the effectiveness of programmed instruction. One kind of information was based upon experience gained from classroom trials of programmed instruction with emphasis upon evidence resulting from measured comparisons between programmed and non-programmed forms of instruction. Another kind of information was essentially an attitude or opinion based on any evidence teachers thought relevant in forming an assessment of programmed instruction. Only teachers who had used programs with a view to assessing their effectiveness could provide any information of the first kind, whereas every teacher who had formed an opinion by any means whatsoever could provide information of the second kind. Both kinds of information provided bases for evaluating programmed instruction.

The difference between the two kinds of information made it possible to ask whether these two bases for evaluation led teachers to form different attitudes towards programmed instruction. If the opinions of teachers who have made some objective assessment of programmed instruction are no different from those held by teachers who have not performed such evaluations, then the value of classroom research as an instrument for improving instruction is cast in serious doubt.

Certain limitations in the comparability of the evaluation should be noted. Not all teachers used the same programs or the same measurement and comparative procedures. Moreover, the programs were used at several grade levels and in various provincial and local school systems. Despite this lack of uniformity in the conditions under which the programs were assessed, there is some consistency in the evaluations made by the users.

Questionnaire items requiring measured assessments of programmed instruction could be answered only by those teachers who had used programs in their own classrooms. Other more general questions which constitute measures of attitude toward programmed instruction were directed to both users and non-users. This chapter also considers relationships between these evaluations and certain characteristics of the teachers making the assessments.

Table 33. Assessment of Pupil Achievement

How would you assess the achievement of your pupils under the conditions of programmed instruction as compared to their achievement without programmed instruction?	Users N	Users %
Much superior to their normal achievement	3	1%
Somewhat superior to their normal achievement	68	33
Similar to their normal achievement	86	42
Somewhat below their normal achievement	15	7
Much below their normal achievement	3	1
Non-response	30	15

Questionnaire item 66

Evaluation Based Upon Classroom Trials

Table 33 contains users' assessments of pupil achievement under programmed instruction as compared to other methods of classroom instruction. Extreme assessments, either negative or positive, are not common. Few teachers reported that the programs were notably less effective than other methods of instruction; few reported superior achievement with the programs. The largest number (42 per cent) reported no differences in pupil achievement under programmed and non-programmed instruction. About a third of the users reported a cautious small increase in pupil achievement over the normal standard.

Similar results were obtained from measuring pupils' speed of learning under the conditions of programmed instruction. As reported in Table 34, most users found little difference in rate, or found that under programmed instruction pupils showed only small improvements over their normal speed.

These results fail to demonstrate two advantages claimed for programmed instruction: that it is faster and that it is more effective than traditional forms of instruction. Several necessary limitations in interpreting these evaluations have already been noted. Despite these limitations, the findings do agree with other more sophisticated attempts to assess the effectiveness of programs.[1] The implications of these results will be discussed in a later section of this report.[2]

Table 34. Assessments of Pupil Rates of Learning

How would you assess the rate of learning of your pupils under the conditions of programmed instruction as compared to their rate of learning without programmed instruction?	Users N	Users %
Much accelerated rate of learning	5	2%
Somewhat accelerated rate of learning	71	35
Similar to normal rate of learning	72	35
Somewhat below normal rate of learning	19	9
Much below normal rate of learning	3	1
Non-response	35	17

Questionnaire item 58

Users' judgments of pupil attitude to programmed instruction are summarized in Table 35. Table 36 contains the users' estimates of the degree to which pupils of varying intelligence benefited from the programs. The outcomes suggest that the strong initial motivation of

[1] L. G. Gotkin and L. S. Goldstein, "Programmed Instruction in the Schools: Innovation and Innovator," in Miles, Matthew B. (ed.), *Innovation in Education* (New York: Teachers College, Columbia University, 1964), pp. 231-248.

Wilbur Schramm, *The Research on Programmed Instruction* (Washington: U.S. Office of Education, 1964).

[2] See the section on "Teacher Evaluation of Programmed Instruction" in Chapter Seven.

pupils under programmed instruction is followed by reduced interest approximating their usual interest in learning. In regard to pupils benefiting from the programs, the largest group of teachers felt that pupils with above average intelligence learned best with the programs. The lower the intelligence of the pupils, the less suitable teachers considered programs to be for such pupils.

Evaluation Based Upon General Attitudes and Opinions

This section reports the responses made to those questionnaire items measuring general teacher attitudes towards programmed instruction. Since these attitudes did not presume or require that teachers had actually used programmed instruction, the same items were given to both users and non-users of the programs. Cases in which the two groups had different attitudes to the same item have been noted. It is significant that both groups held similar opinions about programmed instruction despite the fact that one group had had much greater opportunity to observe programmed instruction and to appraise it objectively in the reality of the classroom. Some of the items bear only indirectly upon evaluation of programmed instruction. These items do, however, touch upon behaviours of teachers which imply an evaluation of programs and a position in regard to the effectiveness question.

In items asking for general assessments of programmed instruction, the project participants made largely cautious claims for the role programs might play in classroom instruction. Few teachers saw programs as universally effective in typical classroom conditions; most teachers regarded programs as effective only "under some classroom conditions" while another large group held that programs were effective "for very specialized purposes." Very few teachers felt the programs were ineffective. These results are summarized in Table 37.

A further item dealt with the role that programs can play in classroom instruction. Few teachers regarded programs as a replacement for the teacher. The remainder of the respondents were divided among those (about one-half of the total) who felt programmed instruction should be integrated with teacher instruction and those (about one-third) who gave programs a place in remedial instruction only. These results are given in Table 38.

One indirect assessment of the programs may be obtained by observing teachers' intentions for future use of programmed materials. Item 49 on the questionnaire asked the participants whether they would consider using programs in the following year. In this respect, users and non-users of the programs held significantly divergent views. Over 70 per cent of the users were willing to use the same or other programs while less than 50 per cent of the non-users indicated a similar willingness. Another indirect measure of teacher attitude to and assessment of the programs may be seen in their recommendations to other teachers. In this regard there were no differences between the two groups; almost two-thirds of the teachers in both groups had recommended at some time the use of programs to other teachers. These indirect assessments of programmed instruction are summarized in Tables 39 and 40.

Table 35. Pupil Attitudes to Programmed Learning

How would you assess the attitude of your pupils to learning under the conditions of programmed instruction as compared to their attitude under usual classroom instruction?	Users N	Users %
Highly motivated under conditions of programmed instruction	28	14%
Strong initial motivation followed by reduced interest	113	55
No difference from usual situation	15	7
Initial dislike followed by increasing interest	12	6
Poorly motivated under conditions of programmed instruction	6	3
Non-response	31	15

Questionnaire item 59

Table 36. Pupil Intelligence and the Effectiveness of Programs

Which groups of pupils learned best under the conditions of programmed instruction?	Users N	Users %
Pupils of above average intelligence	55	27%
Pupils of average intelligence	37	18
Pupils of below average intelligence	25	12
Pupils of all intelligence groups learned in approximately equal degrees	25	12
Non-response	63	31

Questionnaire item 67

Table 37. General Effectiveness of Programs in the Classroom

What is your assessment of the effectiveness of programmed instruction generally?	Users N	Users %	Non-Users N	Non-Users %	Total N	Total %
Highy effective under most classroom conditions	14	7%	7	6%	21	7%
Effective under some classroom conditions	84	41	39	36	123	39
Effective only for very specialized purposes in classroom instruction	74	36	38	35	112	36
Largely ineffective in classroom instruction	8	4	1	1	9	3
Non-response	25	12	23	21	48	15
Questionnaire item 68			$X^2 = 6.46$		$.10 < p < .20$	

Table 38. The Role of Programs in Classroom Instruction

For which of the following purposes is programmed instruction most effective in your opinion?	Users		Non-Users		Total	
	N	%	N	%	N	%
As a replacement for the usual classroom instruction by a teacher	7	3%	3	3%	10	3%
As a supplement to the usual classroom instruction by a teacher	101	49	49	45	150	48
As remedial instruction for selected pupils	57	28	43	40	100	32
Other	4	2	1	1	5	2
Non-response	36	17	12	11	48	15
Questionnaire item 69			$X^2 = 1.47$		$.80 < p < .90$	

Table 39. Intended Future Use of Programs

Would you use programs again next year if CTF made the same selection available to you as was available this year?	Users		Non-Users		Total	
	N	%	N	%	N	%
Would use some programs again from the selection available this year	120	59%	26	24%	146	47%
Would only use different programs, if available	26	13	20	19	46	15
Would not use any programs	10	5	7	6	17	5
Uncertain	33	16	37	34	70	22
Non-response	16	8	18	17	34	11
Questionnaire item 49				$X^2 = 35.54^*$		$p < .01$

Table 40. Teacher Recommendations of Programs

Have you ever recommended to other teachers that they try programmed materials in their classes?	Users		Non-Users		Total	
	N	%	N	%	N	%
Yes	136	66%	66	61%	202	65%
No	66	32	41	38	107	34
Non-response	3	1	1	1	4	1
Questionnaire item 50			$X^2 = 1.15$		$.50 < p < .70$	

* In this and subsequent tables the asterisk indicates a significant difference between the groups defined in the table in respect to their responses to various items on the questionnaire.

The strength of teacher assessments of the programs and indications of some problems in using the programs may be seen in answers to items 51 and 52. In these questions teachers were asked whether programs specially written for their courses would make it more likely that programs would be used in their classes. In reply nearly 80 per cent of the teachers indicated that specially prepared programs would increase their use of this mode of instruction. Asked whether schools should change their courses of study to take advantage of existing programs, only 23 per cent of the teachers advocated such action; a large number (40 per cent) opposed this move, but nearly one-third of the respondents found themselves uncertain on this issue. The responses to these two items are given in Tables 41 and 42.

Finally, the teachers were asked what place they felt programs would occupy in classroom instruction at a time 10 to 25 years from now. Responses fell largely into two categories. One sees programs occupying the more peripheral instructional tasks such as enrichment and remedial instruction; the other sees programs in improved and modified forms performing effective instruction in the classroom. None of the teachers in either group considered that programs will disappear from the educational scene as a fad that leaves no outcomes or after-effects. The responses to the item on the future role of programmed instruction are presented in Table 43.

The Bases of Teacher Assessments of the Programs

On what basis did teachers make their assessments of the programs? What circumstances influenced the formation of their attitudes? To shed some light on these questions, the evaluative decisions of the teachers were compared with the extent and nature of the evaluation made by them. Since only the users had direct experience with the programs, their responses only are used in these analyses.

Did the use of control groups in the evaluation influence the assessments teachers made of the programs? Tables 44 and 45 below compare the use of control groups with the achievement of pupils and with teachers' overall assessment of programmed instruction. Neither of these analyses yielded significant results, indicating that teachers' evaluations of the programs were independent of their use or non-use of controlled comparisons. In Table 44, the teachers are divided into those who did and did not use control groups. Among those who used controls, 44 per cent reported improved pupil achievement while in the other group 37 per cent reported improvement. Similarly in Table 45, teachers' general assessments of programmed instruction cannot be predicted from their use of control groups. Fifty-eight per cent of those who used the controls saw some effective use for programmed instruction in the classroom; 56 per cent of those who did not use control groups held the same opinion.

Table 41. Teacher Attitudes to Program Content

If programs were written specifically for the course of studies in your school system would you be more likely to use them than the programs presently available?	Users		Non-Users		Total	
	N	%	N	%	N	%
Yes	162	79%	84	78%	246	79%
No	10	5	2	2	12	4
Uncertain	30	15	22	20	52	17
Non-response	3	1	—	—	3	1
Questionnaire Item 51			$X^2 = 3.36$		$.30 < p < .50$	

Table 42. Conflicts in Course and Program Content

Should school systems change some of their courses of study to take advantage of the programs now available?	Users		Non-Users		Total	
	N	%	N	%	N	%
Yes	51	25%	21	19%	72	23%
No	84	41	40	37	124	40
Uncertain	63	31	45	42	108	35
Non-response	7	3	2	2	9	3
Questionnaire item 52			$X^2 = 4.24$		$.20 < p < .30$	

Table 43. The Future Role of Programmed Instruction

In 10 to 25 years' time, what place do you think programmed instruction will have in Canadian schools?	Users		Non-Users		Total	
	N	%	N	%	N	%
Programs will be regarded as a fad long since forgotten and ignored	—	—	—	—	—	—
Programs will be the most important single technique for teaching basic facts, understanding and principles	19	9%	2	2%	21	7%
Programs will be used largely for enrichment or remedial instruction	92	45	47	44	139	44
Programs will have been improved and developed into very different and more effective devices for instruction	64	31	32	30	96	31
General classroom instruction will have disappeared to be replaced by programs and other devices, making it possible to organize instruction for each pupil individually	6	3	8	7	14	4
Other	8	4	9	8	17	5
Non-response	16	8	10	9	26	8
Questionnaire item 70			$X^2 = 7.37$		$.10 < p < .20$	

In interpreting the findings presented in these tables it should be recalled that the comparison groups used by the teachers were not rigorously controlled, since very few teachers were able to match pupils in the groups or to assign pupils randomly to them. It would seem, therefore, that control groups constituted on such inadequate bases have little influence upon teachers' judgments of their pupils' achievement or their assessment of programmed instruction.

A very different picture is obtained, however, when the objective measurement is related to pupil achievement. In Table 46 it may be seen that 51 per cent of teachers who made ratings of pupil achievement felt their pupils had done better with the programs than with regular instruction; of the teachers who made a more objective measurement of pupil achievement only 34 per cent held the same view. The methods used to measure pupil achievement did not have any effect upon teachers' overall assessment of programmed instruction, as may be seen in Table 47.

Clear relationships also emerged between the motivation of pupils and their success with the programs. Teachers reported that high motivation on the part of pupils was related to the speed and amount of learning. These findings are summarized in Tables 48 and 49. Whether the motivation of pupils contributed to their success in learning or whether successful learning created motivation cannot be answered from these data. What is clear is that the success of pupils in learning influenced teachers' overall assessment of programmed instruction. This influence may be asserted on the basis that the achievement of pupils and the evaluations by teachers are separate actions with the second following some time after the first. These findings are presented in Table 50 where it may be seen that 54 per cent of the teachers who reported superior achievement among their pupils regarded programs as effective under some classroom conditions; only 17 per cent of teachers who reported lowered pupil achievement held the same view. A reverse trend may be seen among teachers who regard programs as ineffective in the classroom. Eighty-three per cent of teachers reporting lowered achievement regard programs as ineffective; twenty-eight per cent of those reporting superior achievement regard programs as ineffective.

Table 44. Use of Control Groups and Pupil Achievement

	Level of achievement on programmed instruction compared with normal achievement							
	Much or Somewhat Superior		Similar		Much or Somewhat Inferior		Total	
	N	%	N	%	N	%	N	%
No control group used	35	44%	40	50%	5	6%	80	100%
Control group[1] used	27	37	36	49	10	14	73	100
Total	62	40%	76	50%	15	10%	153	100%
Questionnaire items 55 and 66						$X^2 = 2.58$	$.10 < p < .20$	

[1] Types of control: one class divided into groups, separate classes taught by same or different teachers, class(es) of this year compared with class(es) of a previous year.

Table 45. Use of Control Groups and General Assessment of Effectiveness

	No Control Group Used		Control Group[1] Used		Total	
Teacher assessment of programmed instruction	N	%	N	%	N	%
Highly effective under most classroom conditions	8	10%	6	8%	14	9%
Effective under some classroom conditions	38	46	37	50	75	48
Largely ineffective or effective only for very specialized purposes in classroom instruction	36	44	31	42	67	43
Total	82	100%	74	100%	156	100%
Questionnaire items 68 and 55				$X^2 = .26$	$.80 < p < .90$	

[1] Types of control: one class divided into groups, separate classes taught by same or different teachers, class(es) of this year compared with class(es) of a previous year.

Table 46. Measures of Achievement Used and Pupil Achievement

Basis used to assess effectiveness of programmed instruction	Level of achievement on programmed instruction compared with normal achievement							
	Much or Somewhat Superior		Similar		Much or Somewhat Inferior		Total	
	N	%	N	%	N	%	N	%
Rating of effectiveness by pupils and/or teachers	31	51%	27	44%	3	5%	61	100%
Comparison of pupils in different groups, writing same or different examinations, or other method	23	34	33	48	12	18	68	100
Total	54	42%	60	46%	15	12%	129	100%
Questionnaire items 56 and 66						$X^2 = 13.86^*$		$p < .01$

Table 47. Measures of Achievement used and General Assessment of Effectiveness

Teacher assessment of programmed instruction	Basis used to assess effectiveness of programmed instruction					
	Rating of effectiveness by pupils and/or teachers		Comparison of pupils in different groups, writing same or different examinations, or other		Total	
	N	%	N	%	N	%
Highly effective under most classroom conditions	6	10%	5	7%	11	8%
Effective under some classroom conditions	27	44	32	47	59	46
Largely ineffective or effective only for very specialized purposes in classroom instruction	28	46	31	46	59	46
Total	61	100%	68	100%	129	100%
Questionnaire items 68 and 56				$X^2 = .62$		$.80 < p < .90$

Table 48. Pupil Attitudes and Rate of Learning

Pupil Attitudes	Rate of learning under programmed instruction compared with normal rate							
	Much or Somewhat Accelerated		Similar		Much or Somewhat below Normal Rate		Total	
	N	%	N	%	N	%	N	%
Highly motivated; strong initial motivation followed by reduced interest; or initial dislike followed by increasing interest	69	49%	54	38%	18	13%	141	100%
No difference, or poorly motivated	3	18	11	70	2	12	16	100
Total	72	46%	65	41%	20	13%	157	100%
Questionnaire items 59 and 58						$X^2 = 22.84^*$		$p < .01$

Table 49. Pupil Attitudes and Achievement

Pupil Attitudes	Level of achievement on programmed instruction compared with normal achievement							
	Much or Somewhat Superior		Similar		Much or Somewhat Inferior		Total	
	N	%	N	%	N	%	N	%
Highly motivated; strong initial motivation followed by reduced interest; or initial dislike followed by increasing interest	65	46%	62	44%	14	10%	141	100%
No difference, or poorly motivated	2	10	15	75	3	15	20	100
Total	67	42%	77	48%	17	10%	161	100%
Questionnaire items 59 and 66						$X^2 = 12.47^*$		$p < .01$

Table 50. Pupil Achievement and Teachers' General Assessment of Effectiveness

	Level of achievement on programmed instruction compared with normal achievement							
	Much or Somewhat Superior		Similar		Much or Somewhat Inferior		Total	
Teacher assessment of programmed instruction	N	%	N	%	N	%	N	%
Highly effective under most classroom conditions	12	8%	2	3%	—	—	14	8%
Effective under some classroom conditions	37	54	36	45	3	17%	76	46
Largely ineffective or effective only for very specialized purposes in classroom instruction	19	28	41	52	15	83	75	45
Total	68	100%	79	100%	18	100%	165	100%

Questionnaire items 68 and 66 $X^2 = 25.18$ $p < .01$

Summary

This chapter has considered teachers' evaluations of the programs as based both on classroom experience and on more general attitudes and opinions. It attempted as well to determine whether classroom experience influences the general attitudes and also those circumstances which do contribute to the formation of teacher attitudes.

In assessing the effectiveness of the specific programs sent to them, teachers reported that their pupils showed little difference in achievement as between programmed and regular instruction. There were few extreme judgments in this regard, with most teachers reporting no change in pupil achievement or only moderate improvements. Rates of learning were reported similar to those observed under the usual classroom procedures. Teachers found that pupils showed an initially high pupil interest in the programs followed by a reduction to their usual levels of motivation. The users of the programs also felt that pupils with above average intelligence learned best from the programs.

In making a general assessment of programmed instruction, teachers felt that programs can be effective under some classroom conditions, but implied that programs do not constitute an autonomous method of instruction which may be pursued independently of teachers or used as a replacement for the teacher. Teachers were divided as to the role programs can play in classroom instruction with some assigning it to more central insructional tasks and others to the more peripheral work of classroom instruction.

Certain indirect measures of teacher attitude to programmed instruction were also obtained. These reflected generally accepted and optimistic attitudes. Many teachers had recommended the use of programs to other teachers; many would use the same or other programs in another year; and many felt that programs specially written for their courses would increase the usability of programs. Teachers were cautious about changing school courses to take advantage of existing programs, but all felt that programmed instruction is here to stay and that it will find a place in standard classroom instruction in the future.

In examination of the bases for the evaluations it was found that the use of controlled comparison was independent of teachers' assessments of pupil success with the programs. Thus the use of comparison groups did not seem to affect teacher judgments about the effectiveness of the programs. This finding may be an indication of the teachers' inability to establish matched or equivalent groups. However, the use of objective measures of achievement bore a strong relationship to teacher evaluations. Those teachers who used non-objective ratings of program effectiveness were more likely to report superior pupil achievement than those who employed objective measures such as test results.

In further two-way comparisons it was found that pupil achievement and motivation were closely related under programmed instruction. This finding was particularly significant in view of another finding that the achievement of pupils affected teachers' general assessments of programmed instruction. Thus the more successful and highly motivated the performance of their pupils, the more likely were teachers to regard programs as an effective mode of instruction.

CHAPTER SIX

ATTITUDES TO INNOVATION AND EXPERIMENTATION

ATTITUDES TO INNOVATION AND EXPERIMENTATION

The final purpose of the survey was to assess the attitudes of teachers involved in the project to innovation and experimentation in education. This chapter presents findings relevant to that purpose. It includes a section dealing with the efforts made by participants to communicate with others about their work. Another section concerns some social aspects of teachers' involvement with innovation and research. A final section examines some effects of involvement in research upon the kinds of evaluation carried out by the participants.

Communication About the Evaluations

Item 19 of the questionnaire asked users of the programs whether they had made a report on the findings of their evaluations. As indicated in Table 51, under 40 per cent of the participants considered that they had made such a report.

The responses made to item 19 do not, however, agree closely with responses made to other items dealing with reports of the evaluations and the nature of them. The reason for this discrepancy likely lies in the respondents' uncertainty about what constitutes a report. Asked to whom they made reports, nearly 60 per cent of the users indicated that they had made a report to some person or agency. The largest number of reports was directed to the Canadian Teachers' Federation. This outcome could be expected from the fact that CTF encouraged teachers to submit reports on their evaluations. Approximately 13 per cent went to other individuals, such as an inspector or principal. Very few went to *groups* of persons such as the school staff or the teacher's local association. The kind of report given was most likely to be an informal verbal report. About one-fifth of the users indicated that they had made a written report. These results are shown in Tables 52 and 53.

Table 51. Reports of Evaluations

Did you make a report (of any kind) on the findings of your evaluation?	Users N	Users %
Yes	76	37%
No	118	58
Non-response	11	5

Questionnaire item 19

Table 52. Use of the Reports

To whom did you make your most complete report	Users N	Users %
Canadian Teachers' Federation	44	21%
Principal of this school	20	10
Principal and staff of this school	9	4
Staff of this school	11	5
The superintendent, inspector or supervisor	7	3
The members of a local teachers' association or council	5	2
Other	18	9
Non-response	91	44

Questionnaire item 20

Table 53. Kind of Report Made

What kind of report did you make?	Users N	Users %
Written report (typed, mimeographed, etc.)	45	22%
Informal verbal report	60	29
Formal verbal report	4	2
Article in a magazine	—	—
Other	3	1
Non-response	93	45

Questionnaire item 21

The responses summarized in these tables indicate that outcomes of the evaluations were frequently not reported far beyond the school or classroom in which they were collected. Significantly, too, many of the reports were directed to individuals rather than groups. One can only speculate why more reports went to the principal of the school alone rather than to the principal *and* staff.

Apart from the questionnaires themselves, many formal reports were sent to CTF. Some of these have already been published in a collection of teacher research on programmed instruction.[1] The report of this survey will also provide a means of disseminating the results of the teachers' work. It is unfortunate, however, that none of these means of communication will provide direct contact among teachers or the immediate experience that those involved in the evaluations could bring to more direct methods of communication.

The Social Setting

Educational innovation and experimentation do not occur *in vacuo*, but are related rather to social settings and to the attitudes, values, rewards and modes of communication that are imbedded in such systems. A number of items on the questionnaire were designed to examine the context in which teachers made contact with the project and carried on their work with the programs.

Since the use of programs would constitute a departure from established practice, it is reasonable to assume that teachers would require support and encouragement to make such a departure. This support might come from previous successful experience with innovation, from other teachers or from administrators and supervisors. It might be predicted, too, that teachers who lack such support would not embark upon an experimental program or would do so only at some cost to their security in their work and to their satisfaction with the innovation.

[1] Canadian Teachers' Federation, Research Division, *Teacher Research on Programmed Instruction — A Collection and Critique of Studies* (Ottawa: the Federation, 1965), 56 p.

In this regard the survey determined that one-fourth of the participants had previously been involved in a classroom research project. This situation held for both users and non-users of the programs. Thus although the project attracted many teachers who were new to such activity, a substantial group had previous experience. Moreover, nearly half of the total group were in schools where other teachers were using programmed instruction concurrently. This factor defined an important difference between users and non-users. Although 56 per cent of users were in schools where other teachers were trying programs, only one-third of the non-users were similarly situated. Acquaintance with teachers beyond the school who were using programs was less common among the participants and in this respect there was no difference between users and non-users. Apparently their contact with other teachers in the same school who are involved in research or innovation helps to sustain the whole process. Knowledge of teachers outside the school who are engaged in the same work does not apparently substitute for contact in the immediate school context. Many teachers, too, sought the approval of an administrator or supervisor before embarking on their evaluations of the programs.

The results obtained from the items relating to these matters are summarized in Tables 54 to 57.

Table 54. Previous Involvement in Classroom Research

Have you ever been involved previously in a school or classroom research project?	Users		Non-Users		Total	
	N	%	N	%	N	%
Yes	58	28%	28	26%	86	27%
No	146	71	78	72	224	72
Non-response	1	1	2	2	3	1
Questionnaire item 15			$X^2 = 1.53$		$.30 < p < .50$	

Table 55. Involvement with Other Teachers in the Same School

Did any other teachers in your school use programmed instruction this year?	Users		Non-Users		Total	
	N	%	N	%	N	%
Yes	115	56%	35	32%	150	48%
No	83	40	70	65	153	49
Non-response	7	3	3	3	10	3
Questionnaire item 16					$X^2 = 16.946^*$	$p < .01$

Table 56. Involvement with Teachers in Other Schools

Do you know any other teachers outside your school who used programmed instruction this year?	Users		Non-Users		Total	
	N	%	N	%	N	%
Yes	60	29%	31	29%	91	29%
No	143	70	75	69	218	70
Non-response	2	1	2	2	4	1
Questionnaire item 17			$X^2 = .43$		$.80 < p < .90$	

Table 57. Administrative Support for Innovation

Did you obtain permission from your principal, superintendent or inspector, etc., before you used the programs with your classes?	Users	
	N	%
Yes	138	67%
No	59	29
Non-response	8	4
Questionnaire item 22		

* In this and subsequent tables the asterisk indicates a significant difference between the groups defined in the table in respect to their responses to various items on the questionnaire.

Despite the importance of support from other teachers and from administrators, most of the teachers worked alone to carry out their evaluations. About one-fourth of the users worked with other teachers to carry out their work. These cooperative arrangements were made largely between teachers in the same schools. Arrangements between teachers in different schools were rare, as may be seen in Table 58.

Among the reasons given by non-users for the fact that they made no use of the available programs was the lack of time for experimentation. Very few mentioned the withholding of permission to use the programs on the part of a higher authority. The most frequently cited reason for non-use of programs was the unsuitability of their content to courses taught by the teacher. None of these reasons bear directly upon the social context of

innovation, but it may be presumed that with greater group interest arrangements could have been made to provide time for experimentation or to find classes in the school to which the content of the programs was relevant. The reason given for not using the programs are presented in Table 59.

Table 58. Cooperative Arrangements for Evaluation

Did your evaluation involve the participation of other teachers?	Users N	Users %
The evaluation involved only classes under my direction and did not involve other teachers	139	68%
One or more teachers in this school worked with me to make the evaluation of programmed instruction	54	26
One or more teachers in other schools worked with me to make the evaluation	2	1
Other	1	1
Non-response	1	1

Questionnaire item 18

Users of the programs were asked what results might be expected from classroom research. Answers to this question help to define the role that teachers see themselves best fitted for in research. Significantly, teachers view their role along the practical dimension of research. Testing new practices, finding the best procedures for a particular classroom, and spreading information about recent innovation — these were the tasks that teachers selected as defining their role in research (see Table 60). Although they felt that teacher research did yield significant results, they largely rejected the development of educational theory and principles as part of their role in research.

Table 59. Reasons Cited for Not Using the Programs

What was the single most important reason for your deciding not to use the programs made available from CTF?	Users N	Users %
Content of the programs was not suitable to the class I teach	39	36%
On closer examination, programmed instruction did not appear to be a potentially worthwhile and/or reliable teaching device	1	1
Too little time available for experiment in a crowded timetable	29	27
Permission to experiment not granted by some school authority	2	2
No direct contact with pupils in my position	3	3
Original inquiry to CTF sought information only on topic of programmed instruction	9	8
Other	11	10
Non-response	14	13

Non-users' questionnaire, item 18

Table 60. The Role of Teachers in Research

In your opinion, what is the most important result that might be expected from classroom research by teachers?	Users N	Users %
Development of educational theories or principles	12	6%
Testing the effectiveness of new educational practices	68	33
Spreading information and understanding about new practices and principles	38	19
Finding the best techniques to use in a particular classroom or school	62	30
No significant results can be expected	—	—
Other	6	3
Non-response	19	9

Questionnaire item 71

The extent of teacher participation in the project was not distributed equally among the various parts of the country. This inequality arises from differences in the amount of publicity given to the project in the provinces[2], from the varying needs of teachers and from differential access to information and other resources for research. The inequality is due also to cultural and language differences, particularly since the programs were available only in English. To some extent, however, these differences may be explained by the attitudes which teachers hold towards innovation and research. Futher investigation would, of course, be necessary to understand fully the factors in various areas which enhance or impede innovation and research among teachers.

An indication of the differential involvement of teachers in the project may be gained by comparing the number of inquiries and orders that teachers in various provinces placed with CTF. Table 61 ranks the provinces according to the number of orders and inquiries per thousand teachers placed from the various provinces. The number of teachers used was that recorded as being in secondary or elementary-secondary schools for the year 1963-64 in the ten provinces.[3] It will be noted that the rate of involvement per thousand teachers varies widely and that the order of the provinces for inquiries is close to but not exactly that of the rate obtained for orders.

Social Factors Influencing Evaluation

Among the many social conditions which bear upon the evaluation made, two were found to be significantly related to the procedures used. These were the obtaining of permission from school administrators and previous involvement in classroom research. As indicated earlier, about two-thirds of the users obtained permission from

[2] Although the same notice was circulated in all provinces, it was not always carried in the same kind of periodical. Notices appeared sometimes in a newsletter, sometimes in an official journal, and sometimes in a bulletin of a specialist teachers' council.

[3] Dominion Bureau of Statistics, *Preliminary Statistics of Education, 1963-64* (Ottawa: Queen's Printer, 1964), pp. 34-37.

Table 61. Differential Involvement of Teachers in the Project by Province

Province	Inquiries Placed	Inquiries Received Per Thousand Teachers	Province	Orders Placed	Orders Received Per Thousand Teachers
A	25	17.9	B	60	10.6
B	90	15.9	A	11	7.9
C	22	8.0	C	13	4.7
D	128	7.5	E	11	4.2
E	19	7.3	D	63	3.7
F	14	6.5	F	8	3.7
G	2	5.9	H	19	3.6
H	29	5.6	G	1	3.0
I	5	2.7	I	2	1.1
J	35	2.4	J	17	1.1

their principals or supervisors before they used the programs in their classes. This fact was related to the use of comparison groups in the evaluations. Those who had not obtained permission were less likely to have used comparison groups than were teachers who had obtained such permission. A reverse relationship was found regarding assessment of achievement. Those who had not obtained permission were the more likely to have used objective assessments as opposed to ratings of effectiveness. These findings are presented in Tables 62 and 63. The consequences of these findings provide interesting ground for speculation. Since control groups usually require cooperative arrangements between two or more classrooms, administrative help seems necessary to provide the coordination. Administrative coordination may also imply administrative approval for the innovation itself, thus leading to a reduced desire to measure learning outcomes objectively. On the other hand, the teacher who works without administrative cooperation cannot so easily create control groups involving two or more classes. He may, therefore, substitute objective measurement within a single class for the missing control group in another class. It will be recalled, too, that teachers using control groups made higher estimates of pupil achievement under programmed instruction than did teachers who used objective criteria for achievement.[4]

Table 62. Superordinate Permission and Use of Control Groups

Was permission obtained from principal, superintendent or inspector before programs were used?	No Control Group used		Control Group[1] Used		Total	
	N	%	N	%	N	%
Yes	56	49%	59	51%	115	100%
No	36	69	16	31	52	100
Total	92	55%	75	45%	167	100%
Questionnaire items 22 and 55				$X^2 = 6.14^*$	$p < .01$	

[1] Types of Control: one class divided into two groups, separate classes taught by same or different teachers, class(es) of this year compared with class(es) of a previous year.

Table 63. Superordinate Permission and the Measures of Achievement Used

Basis used to assess the effectiveness of programmed instruction	Was permission obtained from principal, superintendent or inspector before programs were used? Yes		No		Total	
	N	%	N	%	N	%
Rating of effectiveness by pupils and/or teachers	38	39%	28	67%	66	47%
Comparison of pupils in different groups, writing same or different examinations, or other method	59	61	14	33	73	53
Total	97	100%	42	100%	139	100%
Questionnaire items 56 and 22				$X^2 = 8.82^*$	$p < .01$	

[4] See Table 46.

In regard to users' previous experience with classroom research, about one-third of the participants had had such involvement. In comparing these groups as to the methods of evaluation used, certain significant trends were noted. Users who had previous experience were more likely than those without this experience to have employed the ideas for evaluation explained in the materials sent from CTF. Similarly, this group was more likely to have used comparison groups in their evaluation designs. Tables 64 and 65 present data defining these trends.

Table 64. Previous Research Experience and Use of Evaluation Design

	Was respondent previously involved in school or classroom research project?					
	Yes		No		Total	
Were the methods for evaluation outlined in CTF materials used?	N	%	N	%	N	%
Used some of the methods of evaluation suggested	19	42%	33	27%	52	31%
Was unable to use the ideas for evaluation, found the methods impractical, or did not read the materials on evaluation	26	58	88	73	114	69
Total	45	100%	121	100%	166	100%
Questionnaire items 54 and 15			$X^2 = 3.55^*$		$.05 < p < .10$	

Table 65. Previous Research Experience and Use of Control Groups

	No Control Group used		Control Group[1] Used		Total	
Was respondent previously involved in school or classroom research project?	N	%	N	%	N	%
Yes	16	36%	28	64%	44	100%
No	75	60	50	40	125	100
Total	91	54%	78	46%	169	100%
Questionnaire items 15 and 55			$X^2 = 5.75^*$		$.05 < p < .10$	

[1] Types of Control: one class divided into two groups, separate classes taught by same or different teachers, class(es) of this year compared with class(es) of a previous year.

Summary

This chapter has dealt with the findings relating to the final purpose of the survey. That purpose was to assess the attitudes of the teachers in the project to innovation and experimentation. The findings in this regard were presented under three headings: efforts of the teachers to communicate their findings, the social setting in which the evaluations were made, and the effect of certain aspects of the social setting upon the evaluations.

The majority of the participants made a report of their work to other persons or agencies. Sometimes these reports were formal written documents, but more frequently they were informal and verbal. A notable feature of the reports was the fact that they were frequently directed to other individuals or to distant organizations, rather than to groups close at hand such as the school staff. A large number of the formal reports were sent to CTF.

The social setting in which teachers were located influenced their participation in the project and presumably had a bearing as well upon their attitudes to more general issues in research and innovation. One-fourth of the project participants had had previous experience with classroom research and this experience may well have disposed them to take part in the programmed instruction project. This condition held for both users and non-users. Half of the teachers were in schools where other teachers were using programs also. In this regard there was a significant difference between the two teacher groups, as users were more likely than non-users to be found in schools where other teachers were using programs. Few of the teachers in either group knew teachers beyond their own schools who were using programs and this condition held for both groups. Two-thirds of the users sought permission from a school authority to use the programs. Despite the contact with other teachers interested in programmed instruction, and despite the permission obtainable from school administrators, most teachers carried out their evaluations without the help or participation of other teachers.

Reasons given by teachers for not using the programs emphasized their lack of time for research and evaluation and the unsuitability of the content of the programs for courses they taught. The teachers emphasized the practical dimension of classroom research when asked to define the role of the teacher in such activity. Rates of teacher involvement in the project varied greatly in different areas of the country. Many factors not related to teachers' attitudes to innovation could explain some part of these differences. Other explanations may rest upon differential acceptance by teachers of research and innovative activity.

Two circumstances in the social setting of schools had a bearing upon the kind of evaluation that teachers made of the programs. Teachers who sought the permission

of school authorities to use the programs were more likely to have used controlled comparisons than teachers who had not sought such permission. Cooperative administrative assistance would seem to be a prerequisite for a teacher who wishes to rearrange school classes so that comparisons of teaching methods may be made. The use of objective criteria for determining effectiveness showed an inverse relationship with administrative permission. Teachers working without explicit permission from the school administration were more likely to have used objective criteria for determining the effectiveness of the programs. A similar relationship held between teachers who had done other classroom research and those who had not previously engaged in such activity. Those who had previous research experience were more likely than those without it to have used standard evaluative procedures in assessing the effectiveness of programs.

The findings reported in this chapter point to patterns of teacher experience and to social settings in schools which influence their attitudes to research and innovation. Our knowledge of the operation of these influences and indeed of their existence is tentative. However, it does seem clear that teachers see a role for themselves in the practical and applied dimension of research and that they willingly accept involvement in such research if conditions conducive to such involvement can be created.

CHAPTER SEVEN

CONCLUSION

CONCLUSION

The concluding chapter of this report summarizes the principal findings of this survey and draws certain implications from them. It should be noted that the respondents to this survey by no means constitute a random sample of teachers in Canada, or even of secondary mathematics and chemistry teachers. The responses may, however, approximate those of other teachers who are interested in classroom research and curricular innovation. The findings of this survey bear most directly, then, upon other work which might be undertaken to involve teachers in in-service training or professional development projects. It is hoped, further, that the findings of this study will be of interest and value to those who undertake such work.

In the fall of 1963 teachers across Canada were given the opportunity to use units of programmed mathematics and chemistry in their own classes. In return for these programs, the teachers accepting them were asked to evaluate the effectiveness of instruction based on these programmed materials. CTF subsequently received 369 requests for information about the programs. These inquiries resulted in 205 orders for programs. The number of participants in the project is not reflected accurately in this figure, however, since some orders were shared among groups of teachers. In other words, the actual number of teachers using the programs was higher than the number of orders placed. All persons who made inquiries were sent a questionnaire at the conclusion of the school year. Those who actually used the programs received a more extensive questionnaire than those who merely made inquiries. This division of the project participants yielded 205 questionnaires returned from "users" and 108 from "non-users". The purposes of the survey were to determine the impact of the project upon the participants and to summarize their assessments of programmed instruction. More detailed commentary upon the purposes, design and findings of the study is found in earlier chapters of this report.

Background of the Participants

Findings related to the characteristics of teachers in the project cannot be usefully compared to teachers as a whole since the participants were not selected on any systematic sample basis. Certain other comparisons are possible, however, particularly those between the two participant groups.

Teacher Characteristics

1. Participants in the survey came from a wide range of schools by size and location. Many teachers, however, were from moderately-sized schools located in non-urban areas.

2. Users were less experienced than non-users of the programs and had less graduate training as well.

3. Many participants had some administrative responsibility in their schools, but this responsibility was in positions below that of principal.

Implications

Participants in the project might be characterized as "activists", those who are involved in work over and beyond the usual classroom responsibilities. Users of the programs were on the whole highly qualified teachers but had less experience and graduate training than non-users. This difference may indicate that teachers who are willing to become involved in research and innovation are those whom extensive training and experience have not set in the traditional patterns of educational practice. If this is the case, explicit attempts should be made to involve teachers of varying age, experience, training and interests in curriculum development and evaluation projects.

Teacher Knowledge of Programmed Instruction

One outcome expected from participation in the project was that teacher knowledge of programmed instruction would expand. Results of the project confirmed this expectation, although the information provided for participants and the activities arranged for them did not relate directly to this purpose.

The Extent of Knowledge

1. Participants had a rather extensive knowledge of programmed instruction before they became involved in the project. This knowledge was demonstrated by their reported familiarity with various names and terms associated with the field.

2. Significant increases in this knowledge occurred among participants during the course of the project.

3. Since the measures of knowledge were based upon self-reports, reliability checks were employed to substantiate claims of knowledge and increases in it. These checks generally substantiated the participants' claims to knowledge.

Sources of Knowledge

4. The most frequently mentioned source of knowledge in the field was periodical literature published by teachers' organizations, including their journals, newsletters, and specialist council bulletins. The material prepared by CTF provided another important source of a similar kind.

5. Information about the project itself often came to teachers through their own professional literature. Another significant source of information was the personal recommendation of another teacher or a supervisor. In this regard, users were more likely than non-users to have contacted the project because of a personal recommendation.

6. The general professional literature in education and programmed instruction provided only a very small source of information for teachers. Teachers apparently read mostly the professional literature that is provided by their own organizations.

The Use of Knowledge

7. Those teachers who were most knowledgeable about the field were found to have conducted their evaluations differently from teachers with less knowledge and to hold different attitudes towards the role of programmed instruction. The most knowledgeable teachers were found to use

objective procedures for evaluation more frequently than did those with less knowledge. In general, too, the knowledgeable teachers held more optimistic views about the role of programmed instruction in the classroom and assigned it to more central instructional tasks.

Implications

Since this project, which aimed to increase teachers' knowledge of programmed instruction, attracted teachers who already had some acquaintance with the field, consideration should be given to contacting and interesting those teachers who have less familiarity. Prior knowledge seemed almost to constitute a prerequisite for participation in the project. If teachers or supervisors propose to instill new knowledge and understanding through similar projects, they must consider how this purpose can best be accomplished. At present, how to achieve such a purpose remains an unsolved problem.

The results of the project did indicate that participants' knowledge of the field increased during the course of the project. How this increase came about is also uncertain since the project provided few explicit means by which such outcomes could be accomplished. In fact, the increases may not have been due in any direct way to the project itself.

The importance of teachers' magazines and journals as sources of information points to the need to increase the amount and broaden the scope of professional material contained in these periodicals. Progress toward this goal has been marked in recent years, but the rapidly increasing fund of information and the rate of change in education would recommend even greater emphasis upon professional content in these publications. The continued development of specialist teachers' councils provides additional channels of communication. Another way to provide information is through the preparation and dissemination of reports and studies by teachers' organizations on current issues in education. The reception given to the materials used in this project demonstrates the reality of a teacher audience seeking the information and resources necessary to try out unfamiliar but promising innovations in instruction.

The reasons for teacher dependence upon publications coming from their own organizations are not entirely clear. Easy access to these sources has a bearing on the matter as does teacher trust in and respect for statements on professional matters coming to them through their own organizations. It is clear, however, that teachers do not tap in any marked degree the extensive sources of information which lie beyond those provided by their own organizations. A further responsibility of these organizations may be therefore to provide channels for such contacts.

It is apparent from the importance of personal recommendation in teachers' decisions to use the programs that effective but informal channels of communication exist among teachers. The nature and extent of these channels are now not known, although study of them might yield important understanding about the pace and direction of change in education. We do not fully understand how teachers acquire knowledge about innovations nor what impels them to or impedes them from action in regard to this knowledge. These problems are worthy of study.

The knowledge possessed by teachers is related to their use of it. For example, teachers having greater knowledge of programmed instruction held distinctive attitudes towards it and made more extensive evaluations of it. Clearly, then, inservice activities or demonstration projects of the kind reported here have an impact, not only upon what teachers know, but also upon the way they use such knowledge. Ultimately, then, this work has important implications for the way instruction is carried out in schools and for the quality of it.

Teacher Use of Evaluation Procedures

Another aim of the project was to encourage teachers to use some evaluative design in assessing the effectiveness of the programs. The materials on evaluation provided by CTF stressed the importance of objective measures of achievement and the use of controlled observation.

Extent of Knowledge

1. As in the case of teacher knowledge of programmed instruction, the participants demonstrated a rather extensive knowledge of research and evaluation which they had acquired before they began working with the project.

2. None of the findings indicated that participation in the project increased the teachers' familiarity with ideas in research and evaluation.

Use of Knowledge

3. Users of the programs were approximately equally divided between those who used some systematic design for assessing the effectiveness of the programs and those who did not. Only one-fourth reported using the methods described in the manual on evaluation sent by CTF. One-third reported that they did not read the evaluation materials and another fourth reported that the methods advocated in the CTF materials were impractical or unsuited in some way to conditions in their classrooms.

4. Most of the evaluations did not use comparison or control groups; in fact only one-third of the users employed such designs. Perhaps the most obvious weakness in the evaluative procedures was the lack of equivalence between comparison groups. Very few participants were able to match the groups or to assign pupils randomly to them. The most common criterion for judging the programs was a rating of effectiveness. About one-quarter of the evaluations used criteria based on pupil achievement.

5. In regard to the manual of evaluation procedures, its acceptance and use seemed to depend upon a prior and rather extensive knowledge of research techniques on the part of the teachers.

Implications

In assessing the impact of the project upon the evaluative procedures used by teachers, a problem arises in defining significant numbers. About half of the participants reported that they used some formal evaluative procedure. This proportion represents a real increase in the number of teachers evaluating programs, since very few could have done such work without the extensive assistance provided by the project. Viewed as a proportion of those given the programs and the means to evaluate them, the number actually making evaluations may seem less striking.

The number of teachers making evaluations probably has less importance than the reasons that led some of them to dispense with formal evaluative techniques in favour of subjective appraisal. The materials explaining evaluative procedures could be used most easily by those who already had some understanding of these procedures. What the manual probably did for these persons was to cast their earlier knowledge into forms which made it readily applicable in their classrooms. It may have demonstrated to teachers possessing research competence how they might apply their skills to problems that they would not otherwise consider suitable for investigation. For those teachers who did not have the background to profit from the evaluative materials, other experiences should be provided to make the ideas of controlled evaluation understandable and compelling.

In addition to the problems of understanding and communication discussed above, many other practical considerations undoubtedly combine to make extensive or elaborate evaluation difficult if not impossible for the teacher engaged in full-time classroom instruction. Extensive administrative support is needed if the necessary time and resources are to be made available for classroom research. These resources and the authority to expend them often lie beyond teachers' power to command. Effective classroom research therefore requires cooperative action between teachers and administrators. The value of teacher research must be balanced off against the costs of providing the necessary resources. The findings of this study demonstrate that teachers having greater knowledge of evaluative procedures used their skills to design better tests of programmed instruction. This evidence may justify creating conditions in schools where teachers are given greater access to research skills and greater encouragement to use them.

The evidence of this study indicates, too, that it is not easy to train teachers in evaluative skills by merely mailing them a manual. Means are needed to make the ideas of evaluation vivid and practical. Subjecting new materials and procedures to critical evaluation must also become an accepted and valued part of the school program. Some part of preparing teachers for research may reasonably be left to a local in-service training project; the larger part requires pre-service training.

Examination of the procedures used by teachers to evaluate programmed instruction leads to the conclusion that many of the designs contained serious imperfections. These inadequacies arose often from circumstances that teachers could not control, such as their inability to assign pupils randomly to classes. Examination of the designs that teachers did find practical within the classroom may require a re-appraisal of the claim that some evaluation is better than none. We need to know under what conditions this contention is true. Other sections of this report suggest what some of these conditions are.[1] In general, it may be said that a by-product of these evaluations — the shaping and stimulation of teacher interest in instructional problems — may constitute the most important and long-lasting outcome obtainable from teacher research and may far outweigh the value of the decisions which teachers make about particular procedures in instruction. The evaluations serve to draw attention to problems in instruction and in cirriculum which might otherwise go unnoticed and unsolved. Although the identification of such problems does not solve them, it is a first and necessary part of educational change and improvement.

Teacher Evaluation of Programmed Instruction

Teachers in the project made evaluations of the programs specifically sent to them and in addition gave general assessments of programmed instruction. The study also examined certain relationships between the evaluations given by teachers and the bases on which these were made.

Evaluation of the Specific Programs

1. Teachers reported little difference between the effectiveness of programmed and other forms of instruction. Observed differences most frequently favoured programmed instruction. Rates of learning were also reported as similar between the two categories of instruction.

2. Teachers reported high initial motivation on the part of their pupils followed by reduced interest.

3. Teachers reported that pupils with above average intelligence seemed to benefit most from the programs.

General Assessments

4. Teachers reported that programs provide an effective mode of instruction in the classroom under certain conditions. They did not regard them as universally effective instructional devices.

5. Teachers felt that while programs did not provide a replacement for the teacher, they did offer a valuable supplement to teacher instruction. How programs could supplement present modes of instruction was not a matter on which there was close agreement. Some teachers would assign programs to the more peripheral instructional tasks while others would use them for more central and important tasks.

Using the Programs

6. Teachers who had tried the programs indicated they would like to use programs again. Those who had not used them indicated less willingness to use them in the future. Successful experiences with programs may thus help to introduce this method of instruction. Nearly two-thirds of the project participants had recommended programmed instruction to other teachers. In this respect there was no difference between users and non-users.

7. Lack of appropriate program content is one factor preventing wider use of programmed instruction. Teachers indicated that they would be more likely to use a program if it had been specifically written for a course they were teaching. About one-quarter of the teachers felt that schools should change their courses to take advantage of existing programs but the remainder opposed such action or were uncertain about it.

8. As to the future of programmed instruction, none of the teachers regarded the method of instruction itself as a fad. In general, teachers anticipated one of two lines of development for programs. One path would see programs taking over such secondary or peripheral tasks as

[1] See Chapter Five.

remedial or enrichment instruction. Another course would see programmed instruction, possibly in a somewhat altered form, carrying out basic tasks.

The Bases of the Evaluations

Teacher assessments of programmed instruction were found to be related to the kind of evaluation performed by the teachers and the success of their pupils with the programs.

9. The use of control groups by teachers had no relationship to the assessment teachers made of the programs. However, one important relationship was found between the assessment made and the kind of measurement teachers used to judge pupil success with the programs. Teachers who used ratings of program effectiveness reported that their pupils did better with the programs than did teachers who used objective measures of pupil achievement.

10. Teachers' judgments of pupil success with the programs and pupil motivation under this mode of instruction were highly related. Apparently, then, pupil success and motivation are as closely linked in this kind of instruction as in others. Pupil success and motivation seemed also to affect teacher assessment of the programs. Teachers were more likely to express satisfaction with programmed instruction if their pupils had performed well with the programs.

Implications

Despite the limitations upon the kind and quality of the evaluation made by teachers in the project, their trials of the programs left them holding opinions about the effectiveness of this mode of instruction that do not differ greatly from the conclusions reached in more rigorous evaluations. The conclusions of teachers about effectiveness were relevant to another widely held opinion on the part of program users. This opinion should be taken into account in any attempt to employ programmed instruction within the formal school system as it is now constituted. Teachers, in this survey at least, held that however effective programs are, they are not an alternative to teacher instruction; they do not constitute an automatic teacher. It has, of course, been apparent for some time that the unsolved problem in programmed instruction is not whether programs are effective, but under what conditions they are effective. We need to know not *if* programs work but in what form, with what content and with what pupils they work best. The findings of this study confirm the need to deal with such problems. It is clear that teachers in this study accepted, on the whole, the idea of programmed instruction. At the same time, they were uncertain as to what aspects of instruction now handled by teachers could best be handled through the use of programmed materials.

Perhaps in response to the uncertainty about the role that programs can best play in their classrooms, the teachers in this survey tended to adopt either an optimistic or pessimistic view of future uses of programs. The pessimistic view would see programs providing a channel for instruction parallel to and essentially like that provided by the teacher. This channel would provide instruction largely for remedial and enrichment purposes. The more optimistic view would assign more central instructional tasks to the programs. Whichever view prevails will depend largely upon the developmental work done to integrate teacher and programmed instruction. If progress is made towards realizing the optimistic view, and if integration is the path followed, then considerably more developmental work will be required than if the aim is merely to add to the classroom another device serving only limited or special purposes in instruction.

The enthusiasm of teachers who have tried programs and the widespread acceptance and recommendation of it by teachers in this survey, suggests that other and more extensive opportunities should be provided for developmental and evaluative projects. In this connection attention should be given to the practical but very important problem of program content. Many teachers indicated that they did not use the programs because their content was inappropriate to their courses; many teachers too sought programs dealing with specific purposes and topics rather than complete courses. In order to increase the use of programmed instruction, projects of the kind carried out here would seem to be highly valuable. Attention should be given to such practical questions as program content and adaptation of both procedures and content to local needs and conditions.

Some of the most important findings of the study deal with the relationships found between the kind of evaluation performed by teachers and their assessments of the programs. Although the use of controlled comparison did not influence the assessments, the use of objective achievement measures with controlled comparison did. Pupil reactions were also significant in determining teacher judgment of the programs. In interpreting these findings it should be remembered, of course, that teachers had difficulty in establishing matched or equivalent comparison groups. Thus whatever teachers thought this procedure was doing for their judgments, its real effects were nonexistent. In this research, then, if teachers, for whatever reason, cannot create in their classrooms the conditions for accurate evaluation? In answer, the effect of the objective measurements with controlled observation should be considered. The use of these procedures acted to temper teacher enthusiasm for the programs and to reduce their estimates of effectiveness.

These findings suggest the need to examine what happens when teachers become involved in classroom research. The outcomes of this involvement may be more concrete and more far-reaching than has been supposed up to now. Further projects, therefore, should be undertaken to assess the impact of research upon teacher perceptions of the instructional process and their acceptance or rejection of educational innovation.

Attitudes to Research and Innovation

The final part of this report dealt with some teacher attitudes to research and innovation and with social factors which may have influenced those attitudes. Particular attention was given to teachers' efforts to communicate about their work and to conditions in schools which facilitated their participation in the work.

Communication About the Project

1. Most of the teachers involved in the project made some report of their work to some other person or agency. These reports were often informal and verbal. Many of the more formal written reports were made to CTF. This outcome no doubt resulted from the encouragement CTF gave participants to report on the use they had made of the programs.

2. The reports typically went to individuals or distant agencies rather than to groups of persons such as the school staff, who were close to the work done and the person who had done it.

The Social Setting

3. Previous experience with a research project was a factor disposing teachers to become involved in the current project. Another strong influence leading to participation came from the presence of other teachers in the same school who were also using programs. This characteristic of the social setting seemed to distinguish users from non-users. Users were likely to be one of a group of teachers in the same school who were trying out programs; non-users were likely to be alone in their schools as far as interest in the project and the use of programs was concerned. Despite the social nature of interest in programs, most teachers worked alone to make their evaluations.

4. Teachers frequently sought permission from their principals or other school authorities before using the programs in their classes.

5. The most common explanations given for not using the programs were lack of time for experimentation in a crowded timetable and lack of appropriate content in the programs.

6. Teachers saw their role in research as limited to the practical dimension — the testing of new materials and practices, the spreading of ideas, the discovery of solutions to problems unique to their classrooms. They affirmed the value of activities of this kind but regarded more theoretical and basic research as inappropriate to their interests and capabilities.

7. Differential rates of involvement in the project appeared in comparisons of teacher responses to the project. These differences were very large, with inquiries ranging from nearly 18 per thousand secondary teachers in a province to less than three inquiries per thousand. These differences can be explained in part by factors not related to teacher attitudes or to social acceptance of innovation. It was felt, however, that they arose in part from conditions related to such factors.

Effects Upon Evaluations of Social Setting

8. Teachers who had obtained permission from some school authority to use the programs in their classes were likely to have used controlled comparisons in their evaluations. Teachers who depended upon objective measures in controlled comparison were likely to have acted without administrative authorization.

9. Similarly, teachers who had previous experience in classroom research were those most likely to have used some explicit evaluative design and to have made use of controlled comparison groups.

Implications

The reporting of teacher work with the programs provides interesting grounds for speculation about teachers' attitudes to innovation and research. The significant feature here was the number of reports which went to individuals or distant agencies. Why did teachers more frequently give their most complete reports to principals rather than to the school staffs? This behaviour may reflect group indifference or hostility to innovative and research activity or may indicate ambivalence on the part of participants about the soundness, value, or acceptability of their work. In either case, these findings suggest a need for providing means by which teachers involved in such work can make its outcomes more widely known and appreciated in the setting in which it is carried out. Attempts should be made to capitalize upon the immediate experience and enthusiasm of teachers who have done such work. Formal channels of communication, while necessary and valuable, rarely transmit the richness of reality of the actual event. If these experiences are to be used, they must be used in the school context in which they arose.

As to the formal channels of communication, many teachers looked to CTF to provide this service. The lack of wide communication at the local levels suggests further that teachers' organizations should provide means to disseminate information about such activity so that broader and more effective networks of communication may be established among educational innovations. Since the progress of social systems depends upon innovation, and since in any system innovators will form a minority of the total group, provision for such communication is all the more important.

The context in which teachers worked and carried on their evaluations, and the differences in this context between users and non-users, help to define a social system operating in schools which shapes teacher attitudes to research and innovation. The participation of a teacher in the project depended in part at least upon the number of teachers in the school interested in programmed instruction; upon past experience with classroom research; and upon permission granted by a school authority. If the rate and direction of educational change are to be altered or controlled in any way, more knowledge than is available now must be obtained on the operation of this system.

Administrative permission emerged as a significant factor for teacher participation in the project. There is little evidence that teachers found such permission hard to obtain, although they apparently found it necessary to obtain. The important point here is not whether administrative approval is a necessary or desirable thing for teacher research; more important is the fact that substantive help as well as passive approval is often necessary from administrative authorities in order to conduct worthwhile teacher research. Teachers need help in arranging experimental conditions, and in establishing co-operative arrangements for research among teachers. These conditions can most easily be established through active administrative assistance to the researchers or innovators.

The differences between teachers who sought administrative permission and those who did not, and similar differences between teachers with and without research ex-

perience, provide an interesting glimpse of the innovative teacher. The teacher who does not seek authoritative permission for his work and who has done some such work before is one who is likely to be of an independent and analytical turn of mind. He is likely to be disposed to use scientific procedures in evaluating new instructional materials or procedures and is less likely to give them uncritical approval. His lack of commitment to the social system of the school or to the proposition under investigation would seem to dispose him to seek out innovation but to subject it at the same time to an independent and objective evaluation. The value of such attitudes in teachers should be evident enough, although the support and propagation of them might cost something and cause various problems not otherwise encountered in the school.

It is evident that practical problems determined whether and how teachers used the programs. In addition to difficulties in arranging experimental conditions, there was the problem of lack of time for teacher research. This difficulty, too, could be resolved through administrative action. Another practical difficulty stems from the content of the programs. It is evident that increased use of programs would result from providing teachers with more programs and information about programs; evident too is the need to create programs that are more directly related to particular courses of Canadian teachers.

The teachers participating in this project were well aware of the value of classroom research and appreciated that their part in the total research process should emphasize various practical tasks. The need for more extensive and more exhaustive applied research in education suggests that this reservoir of teacher interest should be used more extensively and purposefully than it has in the past to speed the rate of innovation and to improve the effectiveness of instruction. Estimates of the pace at which educational innovations are adopted have placed their "half-life" rates at between 20 and 100 years. Thus for many innovations it takes this span of years for half of the educational systems in the country to adopt them. These exceptionally slow rates can probably be advanced most easily by directing greater attention to the individuals within the system, such as teachers, rather than to the systems themselves.

This project indicates that many teachers are willing to take part in innovation if they are given the opportunity to do so. By linking more theoretical approaches to educational problems to teachers' evident interests in the practical aspects, the whole educational research movement in Canada may make a more significant contribution to school improvement than has been evident in the past.

APPENDIX

THE QUESTIONNAIRES

THE QUESTIONNAIRES

Two similar questionnaires were used in the survey. This appendix contains that which was sent to "users" of the programs. The asterisks beside certain items identify the items which formed the questionnaire sent to "non-users". Thus the questionnaire designed for non-users was less extensive than that sent to users since the items dependent upon knowledge of specific programs were removed in the form sent to non-users. One item on the non-users' questionnaire sought information as to why the respondent did not use any programs after his initial inquiry indicated he was interested in doing so. This item is the only one appearing on the non-users' questionnaire that did not also appear on the users' questionnaire. This item is given immediately following the presentation of the users' questionnaire.

In the following questionnaire the item numbers have been replaced by the column numbers of the card used in the data analysis. Since data from some items required more than one card column, reference to the data by the original item number would be ambiguous. The first five columns on the card contained a code number and so the first item is referred to by the number six, its card column number.

QUESTIONNAIRE

TEACHER ASSESSMENT OF THE EFFECTIVENESS OF PROGRAMMED INSTRUCTION

*6. How many years of teaching experience have you had, counting this year?

CIRCLE one

1	2	3	4	5	6	7	8	9	10	11	12	13	14
15	16	17	18	19	20	21	22	23	24	25	26	27	28
29	30	31	32	33	34	35	36	(specify if greater)					

*7. How many teachers are in your school?

CIRCLE one

1	2	3	4	5	6	7	8	9	10	11	12	13	14
15	16	17	18	19	20	21	22	23	24	25	26	27	28
29	30	31	32	33	34	35	36	37	38	39	40	41	42
43	44	45	46	47	48	(specify if greater)							

*8. What is the size of the community in which your school is located?

CHECK one (✓)

1 ..... rural area or small town (population under 500)
2 ..... village or town (population under 1,000)
3 ..... town (population 1,001 - 5,000)
4 ..... large town (population 5,001 - 20,000)
5 ..... small city (population 20,001 - 50,000)
6 ..... city or its suburbs (population of city and suburbs 50,001 - 200,000)
7 ..... metropolitan area or its suburbs (population of area and suburbs over 200,000)

*9. Do you hold a bachelor's degree from a university?

CHECK one (✓)

1 ..... yes
2 ..... no

*10. Have you ever done graduate study at a university for a master's or doctor's degree?

CHECK one (✓)

1 ..... yes
2 ..... no

*11. On what subject do you spend the largest proportion of your teaching time?

CHECK one (✓)

1 ..... Mathematics
2 ..... Chemistry
3 ..... Physics
4 ..... Biology
5 ..... English
6 ..... Foreign Languages
7 ..... Social Studies, History, or Geography
8 ..... Other (Please write in) .....

.....

.....

*12. Do you have major administrative responsibilities in this school besides your teaching duties?

CHECK one (✓)

1 ..... Principal
2 ..... Vice-Principal
3 ..... Department Head
4 ..... Counsellor
5 ..... Teachers' Representative
6 ..... Other (please write in) .....

.....

.....

.....

*13. In what grade do you spend the largest proportion of your teaching time?

CHECK one (✓)

1 ..... Below Grade 8
2 ..... Grade 8
3 ..... Grade 9
4 ..... Grade 10
5 ..... Grade 11
6 ..... Grade 12
7 ..... Grade 13
8 ..... Other (please write in) .....

.....

.....

*14. How did you first learn of the project in programmed instruction being carried on by CTF?

CHECK one (✓)

1 ..... read a notice in a teachers' journal
2 ..... heard an announcement at a meeting or conference
3 ..... recommended to me by another teacher
4 ..... recommended to me by a supervisor (principal, inspector, etc.)
5 ..... other (please write in) .....

.....

.....

*15. Have you ever been involved previously in a school or classroom research project?

CHECK one (✓)

1 ..... yes
2 ..... no

*16. Did any other teachers in your SCHOOL use programmed instruction this year?

CHECK one (✓)

1 ..... yes
2 ..... no

*17. Do you know any other teachers OUTSIDE YOUR SCHOOL who used programmed instruction this year?

CHECK one (✓)

1 ..... yes
2 ..... no

18. Did your evaluation of programmed instruction involve the participation of other teachers?

CHECK one (✓)

1 ..... the evaluation involved only classes under my direction and did not involve other teachers
2 ..... one or more teachers in THIS SCHOOL worked with me to make the evaluation of programmed instruction
3 ..... one or more teachers in OTHER SCHOOLS worked with me to make the evaluation
4 ..... other (please write in) .....

.....

.....

19. Did you make a report (of any kind) on the findings of your evaluation?

CHECK one (✓)

1 ..... yes
2 ..... no

20. To whom did you make your most complete report?

1 ..... Canadian Teachers' Federation
2 ..... principal of this school
3 ..... principal and staff of this school
4 ..... staff of this school
5 ..... the superintendent, inspector or supervisor
6 ..... the members of a local teachers' association or council
7 ..... other (please write in) .....

.....

Comment: (if any) .....

.....

.....

21. What kind of report did you make?

CHECK one (✓)

1 ..... written report (typed, mimeographed, etc.)
2 ..... informal verbal report
3 ..... formal verbal report
4 ..... article in a magazine
5 ..... other (please write in) .....

.....

Comment: (if any) .....

.....

.....

22. Did you obtain permission from your principal, superintendent or inspector, etc., before you used the programs with your classes?

CHECK one (✓)

1 ..... yes
2 ..... no

*23-30. Which of the following terms *associated with programmed instruction* are you familiar with? Indicate your familiarity with them now as compared to the month of August in 1963.

Familiar with Now CHECK EACH TERM (✓) Yes	No		*Was Familiar with Last August* CHECK EACH TERM (✓) Yes	No
0		Branching	5	
1		Frame	6	
2		Stimulus-Response	7	
3		Grid Space	8	
4		Small Steps	9	

*31-38. Which of the following names *associated with programmed instruction* are you familiar with?

Familiar with Now CHECK EACH NAME (✓) Yes	No		*Was Familiar with Last August* CHECK EACH NAME (✓) Yes	No
0		Skinner	5	
1		Crowder	6	
2		Pressey	7	
3		Stolurow	8	
4		Fisker	9	

*39-47. Have you read about programmed instruction in any of the following publications?

CHECK EACH PUBLICATION (✓) Yes	No	
0		any magazine published by a provincial teachers' organization
1		any journal sponsored by a provincial specialist teachers' council
2		"AV Communication Review"
3		"Educational Research"
4		"Theory into Practice"
5		"Phi Delta Kappan"
6		"Programmed Learning — And Its Future in Canada"
7		"Evaluating Programmed Instruction Materials Through Action Research"
8		other (please write in) .....

48. Have you used programmed materials other than those supplied through CTF for the instruction of pupils in your classes?

CHECK one (✓)

1 ..... have never used programs except those from CTF
2 ..... have used programs other than those sent by CTF

*49. Would you use programs again next year if CTF made the same selection available to you as was available this year?

CHECK one (✓)

1 ..... would use some programs again from the selection available this year
2 ..... would only use different programs, if available
3 ..... would not use any programs
4 ..... uncertain

Comment: (if any) .....

*50. Have you ever recommended to other teachers that they try programmed materials in their classes?

CHECK one (✓)

1 ..... yes
2 ..... no

*51. If programs were written specifically for the course of studies in your school system, would you be more likely to use them than the programs presently available?

CHECK one (✓)

1 ..... yes
2 ..... no
3 ..... uncertain

*52. Should school systems change some of their courses of study to take advantage of the programs now available?

CHECK one (✓)

1 ..... yes
2 ..... no
3 ..... uncertain

53. Did you make an evaluation of the effectiveness of programmed instruction?

CHECK one (✓)

1 ..... yes
2 ..... no

Please enclose any written reports available on your evaluation unless you have already sent a copy to CTF.

54. Did you use any of the methods for evaluation outlined in materials sent to you from CTF?

CHECK one (✓)

1 ..... I used some of the methods of evaluation outlined
2 ..... I was unable to make use of the ideas for evaluation
3 ..... I found the methods impractical for use in the classroom by teachers
4 ..... I did not read the materials on evaluation

55. What comparison or "control" group did you use in your evaluation?

CHECK one (✓)

1 ..... no comparison groups used
2 ..... one class divided into groups
3 ..... separate classes taught by the same teacher
4 ..... separate classes taught by different teachers
5 ..... class(es) of this year compared to class(es) of a previous year
6 ..... other (please write in) .....

.....

.....

56. What basis was used to assess the effectiveness of programmed instruction?

CHECK one (✓)

1 ..... a rating of effectiveness by pupils and/or teachers
2 ..... a comparison of pupil achievement in different groups
3 ..... a comparison of pupil achievement in different groups writing different examinations
4 ..... other (please write in) .....

.....

Comment: (if any) .....

.....

.....

57. If comparison groups were used, how were pupils in them assigned to particular groups?

CHECK one (✓)

1 ..... no special arrangement of pupils other than the grouping procedures usually followed in school
2 ..... pupils were randomly assigned to classes for the evaluation
3 ..... pupils were matched AND randomly assigned to classes for the evaluation

58. How would you assess the RATE of learning of your pupils under the conditions of programmed instruction as compared to their rate of learning without programmed instruction?

CHECK one (✓)

1 ..... much accelerated rate of learning
2 ..... somewhat accelerated rate of learning
3 ..... similar to normal rate of learning
4 ..... somewhat below normal rate of learning
5 ..... much below normal rate of learning

59. How would you assess the attitude of your pupils to learning under the conditions of programmed instruction as compared to their attitude under usual classroom instruction?

CHECK one (✓)

1 ..... highly motivated under conditions of programmed instruction
2 ..... strong initial motivation followed by reduced interest
3 ..... no difference from usual situation
4 ..... initial dislike followed by increasing interest
5 ..... poorly motivated under conditions of programmed instruction

Comment: (if any) .....

.....

.....

.....

60-65. Are you familiar with the following terms in evaluation and research?

CHECK (✓) EACH term you are familiar with.

Was Familiar with Last August			*Am Familiar with Now*	
Yes	No		Yes	No
.....	.....	Randomization	.....	.....
.....	.....	Matching of Groups	.....	.....
.....	.....	Standard Deviation	.....	.....
.....	.....	Significant Difference	.....	.....

66. How would you assess the achievement of your pupils under the conditions of programmed instruction as compared to their achievement without programmed instruction?

CHECK one (✓)

1 ..... much superior to their normal achievement
2 ..... somewhat superior to their normal achievement
3 ..... similar to their normal achievement
4 ..... somewhat below their normal achievement
5 ..... much below their normal achievement

67. Which groups of pupils learned best under the conditions of programmed instruction?

CHECK one (✓)

1 ..... pupils of above average intelligence
2 ..... pupils of average intelligence
3 ..... pupils of below average intelligence
4 ..... pupils of all intelligence groups learned in approximately equal degrees

*68. What is your assessment of the effectiveness of programmed instruction generally?

CHECK one (✓)

1 ..... highly effective under most classroom conditions
2 ..... effective under some classroom conditions
3 ..... effective only for very specialized purposes in classroom instruction
4 ..... largely ineffective in classroom instruction

Comment: (if any) .....

*69. For which of the following purposes is programmed instruction MOST EFFECTIVE in your opinion?

CHECK one (✓)

1 ..... as a replacement for the usual classroom instruction by a teacher
2 ..... as a supplement to the usual classroom instruction by a teacher
3 ..... as remedial instruction for selected pupils
4 ..... other (please write in) .....

Comment: (if any) .....

*70. In 10 to 25 years' time, what place do you think programmed instruction will have in Canadian schools?

CHECK one (✓)

1 ..... program will be regarded as a fad long since forgotten and ignored
2 ..... programs will be the most important single technique for teaching basic facts, understanding and principles
3 ..... programs will be used largely for enrichment or remedial instruction
4 ..... programs will have been improved and developed into very different and more effective devices for instruction
5 ..... general classroom instruction will have disappeared to be replaced by programs and other devices, making it possible to organize instruction for each pupil individually
6 ..... other (please write in) .....

71. In your opinion, what is the most important result that might be expected from classroom research by teachers?

CHECK one (✓)

1 ..... development of educational theories or principles
2 ..... testing the effectiveness of new educational practices
3 ..... spreading information and understanding about new practices and principles
4 ..... finding the best techniques to use in a particular classroom or school
5 ..... no significant results can be expected
6 ..... other (please write in) .....

72. What changes in school or classroom procedures would permit programmed instruction to be developed to its full potential?

Comment: (if any) .....

73. What are the most serious limitations in programmed instruction which might prevent its becoming an effective and widely accepted educational device?

Comment: (if any) .....

74. If another teacher asked you for advice on the application of programmed instruction in the classroom, how would you recommend that it be used?

Comment: (if any) .....

75. Would you like to receive a follow-up on this project?

CHECK as many as desired (✓)

1 ..... no report or follow-up of any kind desired
2 ..... CTF report on the project
3 ..... reports of other teachers' experiences with programmed instruction
4 ..... report from an association of teachers concerned with programmed instruction

*Do you have any comments on the project in general?

.....

NON-USERS' QUESTIONNAIRE

The following item appeared on the questionnaire sent to non-users but not on that sent to users.

18. What was the single most important reason for your deciding not to use the programs made available from CTF?

1 ..... content of the programs was not suitable to the classes I teach
2 ..... on closer examination, programmed instruction did not appear to be a potentially worthwhile and/or reliable teaching device
3 ..... too little time for experiment in a crowded timetable
4 ..... permission to experiment not granted by some school authority
5 ..... no direct contact with pupils in my position
6 ..... original inquiry to CTF sought information only on the topic of programmed instruction
7 ..... other (please write in) .....

QUESTIONNAIRE TOPICS

The items on these questionnaires dealt with a number of topics. These topics and the items referring to them are listed below. The chapters of the report dealing with these topics and teachers' responses to them are also noted.

Table 66. Items on the Questionnaires Classified by Topic and Chapter

Personal Characteristics: Chapter Two

6, 9, 10

School and Community Characteristics: Chapter Two

7, 8

Teaching Duties: Chapter Two

11, 12, 13

Knowledge of Programming and Evaluation: Chapters Three, Four

23-30, 31-38, 48, 60-65

Sources of Knowledge About Programming and Evaluation: Chapters Three, Four

14, 39-47

Individual and Group Involvement in Programming and Research: Chapter Six

15, 16, 17, 18, 22

Method of Evaluation: Chapter Four

53, 54, 55, 56, 57

Results of Evaluations: Chapter Five

58, 59, 66, 67

General Assessment of Programmed Instruction: Chapter Five

49, 50, 51, 52, 68, 69, 70

Kind of Report: Chapter Six

19, 20, 21, 71

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